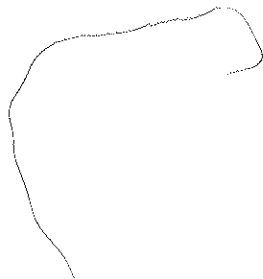


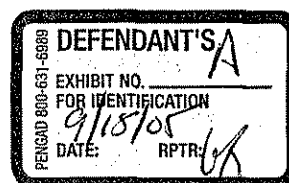
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Engineer's Report
The Arben Mustafa Injury
On
June 3, 1998



Prepared By:
Neal A. Growney, P.E.
June 3, 2005

Neal A. Growney & Assoc., L.L.C.

Franklin Lakes, New Jersey 07417-2319

The Arben Mustafa Injury

Engineer's Report

June 3, 2005

1.0 Introduction.

On June 3, 1998, Arben Mustafa was utilizing a press brake in his work at Eliou Steel Fabrication, Inc., 319 Frost Street, Brooklyn, New York, 11122. He was involved in an incident in which the wrist areas of his arms were injured. I investigated this matter in order to determine its cause.

2.0 Materials Reviewed for Preparation of Report.

- 2.1 My inspections, on April 5, 2001 and December 7, 2001, of the press brake involved in this incident.
- 2.2 Transcripts of the Depositions of: Colin Dean Albrecht; Frederick Bezler; Peter Eliou; Patrick Leach; Andrew Scopelitis; and Arben Mustafa, 3/7/02, 4/1/02 and 7/26/02.
- 2.3 Plaintiff's Response to Defendant Halkin Tool, LTD.'s Request for Production of Documents.
- 2.4 Defendant's Initial Disclosure, Albrecht Exhibit 2, 4/18/02.
- 2.5 Defendant Halkin Tool, LTD.'s Response to Plaintiff's Second Set of Requests for Production of Documents to Defendant Halkin, Albrecht Exhibit 3, 4/18/02.
- 2.6 Third-Party Defendant's Initial Disclosure, Scopelitis Exhibit 1, 4/15/02; including: Employer's Report of Injury/Illness; Walsh-Atkinson Company, Inc. Quotation of September 13, 1990 to Eliou Steel Fabrication Inc.; Accurpress Instruction Manual 725012.
- 2.7 A color copy of a photograph, Scopelitis Exhibit 2, 4/15/02.
- 2.8 Color copies of twenty photographs, Scopelitis Exhibit 4, 4/15/02.
- 2.9 Color copies of twenty-three photographs, Scopelitis Exhibit 5, 4/15/02.
- 2.10 Color copies of twenty photographs, Scopelitis Exhibit 6, 4/15/02.
- 2.11 Color copies of twenty-five photographs, Scopelitis Exhibit 7, 4/15/02.
- 2.12 Color copies of twenty-two photographs, Scopelitis Exhibit 8, 4/15/02; including Leach Exhibits 2 & 3, 5/24/02.
- 2.13 Color copies of twenty-four photographs, Scopelitis Exhibit 9, 4/15/02.
- 2.14 Record of Eliou Steel Fabrication, Inc. Safety Training Meeting held on 8/21/95; Leach Exhibit 1, 5/24/02.
- 2.15 A one page hand written "Doc's viewed" document, dated Apr 17/02; Albrecht Exhibit 1, 4/18/02.
- 2.16 Color copies of eight photographs; Albrecht Exhibits: 4, 5, 6, 7, 8, 9, 10, 11; 4/18/02.
- 2.17 Video tapes entitled: Mustafa-Machine Inspection 7/8/98; Q-3954 Mustafa v. Halkin Tool Ltd. Inspection – original taken by W.B. Eaton, P.E.; Rheingold Valet Metal Bending Machine Re: Mustapha –No Sound-.

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2.18 U.S. Department of Labor, Occupational Safety and Health Administration' file Number 300617792, including black and white copies of twenty-seven (27) photographs.

3.0 Description of Incident.

June 3, 1998 Arben Mustafa's started work at approximately 7 AM. It was his third day at work for Eliou. Previously, he bent a number of flat pieces of steel on the incident press brake for stair treads. Approximately 10 – 15 pieces remained unfinished. Mustafa began work by bending the remaining pieces.

At approximately 7:30 AM, the operation was changed to bending pieces that were longer, narrower and thinner than those Mustafa had been bending. Frederick Bezler, adjusted the machine to bend the new pieces at approximately the middle of their width. Bezler bent two pieces and then Mustafa took over. Bezler left the area. Mustafa placed a piece in the press brake and stepped on the foot pedal. The machine's ram descended, bent the piece, and rose. The bent piece rose with the ram. It fell behind the ram and die area of the press brake. Mustafa instinctively followed the piece with his hands by reaching through the opening in the press between the ram (punch) and die, in order to retrieve the piece. Mustafa touched it with his hands. While his arms were within the area between the ram (punch) and die, the ram descended and amputated both of his hands.

4.0 The Press Brake Involved.

The press brake involved is an Accurpress, Richmond, B.C.; Model 725012 , Serial Number 1710, Date 11-90, 30 HP, 230 V., 74 A., 3 Ph., 60 HZ, CAB 9198. Schematic 3-4597, 3-4544, 3-4545, 3-4643. See photos # E-19, C-2, D-2.

5.0 Basis for Opinions.

My opinions are based upon my engineering education, training and experience as a Professional Engineer and the facts of this incident. I received a B.S. in Mechanical Engineering from Newark College in 1968, and a New Jersey Professional Engineers License in 1973. I have attended lectures, courses and seminars including: Supervisors Safety Program by the New Jersey Manufacturers Insurance Company; Roll Forming Systems by the Fabricating Manufacturers Association; and Industrial and Commercial Power Distribution, by The Electrification Council. My engineering education has included the study of machine design, automatic controls, strength of materials, mechanics, statics and dynamics, and electrical circuits and controls. I am thoroughly familiar with the literature, as well as standards, codes, rules and regulations relating to the safe use of industrial machinery, including press brakes. My training includes engineering practices and procedures and industrial safety practices and procedures.

My mechanical engineering experience spans approximately thirty-seven years. It includes over twenty five years of safety experience and responsibility in metal working manufacturing, four of which was as the Chairman of the Corporate Safety Committee for a large metalworking company with over 1200 employees. I have extensive machine guarding

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experience including, designing, specifying, building, installing, maintaining, repairing, inspecting and supervising the utilization of machine guards and devices, including photoelectric devices. I taught a college course at Newark College of Engineering that included the safe operation of industrial metalworking machinery.

I am a member of the American National Standard Safety Committee for Woodworking Machinery; ANSI O1.1, the American National Standard Safety Committee for Three-roller Printing Ink Mills ANSI B65/NAPIM 177.1; and the American National Standard Safety Committee for Printing Ink Vertical Post Mixers, ANSI B65/NAPIM 177.2; and have participated in the writing of their ANSI Safety Standards. I also participated in the writing of the first Metal Framing Manufacturers Association industry standard. I am a member of the American Welding Society, the American Society of Safety Engineers, the American Society of Mechanical Engineers, the Society of Automotive Engineers and the Human Factors and Ergonomics Society. I have co-authored two publications directed to the safe utilization of tablesaws.

I have designed and developed products for manufacture and designed and specified manufacturing methods, procedures and equipment. I am experienced with processes utilized to bend metal products, including press brake bending. I am familiar with press brake operations and have over seven years of hands-on press brake experience, and over twenty-five years of power press experience. I am familiar with the customs and practices in metalworking and fabrication of metal parts.

I have been performing reconstruction of industrial accidents for the past nine years; the last five have been with my own firm, Neal A. Gowney & Assoc., LLC. I have been routinely called upon to evaluate industrial machinery accidents and perform analytical reconstruction of them. I have performed over three hundred inspections and investigations of such accident; including similar press bake injury incidents. I have been qualified and testified in both state and federal courts of law.

For this investigation, I reviewed deposition testimonies, pleading, reports, plans, specifications, manuals, instructions and engineering drawings. I inspected, operated and photographed the incident press brake; and reviewed photographs and videos by others. I have reviewed literature representative of that available for this industry and relied upon, among other items, information in patents. The methodology I employed, enjoys general acceptance in the community of safety engineers and others with specialized knowledge qualified to opine as to the reasonableness of an industrial product's level of safety for its intended use. My experience is useful and relevant. All standards, codes, rules, regulations, articles and authors cited are typical of the kind relied upon by qualified safety engineers performing investigations such as this. I have employed a level of intellectual rigor expected of an expert in this field. My opinions are given from a sound, reasoned basis.

Attachment A is my curriculum vitae, setting out my qualifications and experience.

6.0 Inspection Observations.

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6.1 At the April 5, 2001 inspection the incident press brake could be operated only in the Hand control mode. The key switch for Hand/Foot control selector switch had been set locked in the Hand position. The key was not available to change the operational mode to Foot control. The key was available for the December 7, 2001 inspection. The press brake was operated in both Hand and Foot control mode at that inspection.

6.2 The press brake is equipped with a portable operator's control station, approximately 35 inches high, having a handle on its top (Photos # E-19, white arrow; C-18). Its front switch panel contains: Start, Hand/Foot selector, {blank}, Jog/Auto/Man, unmarked (Photo # D-7). It has a foot actuated switch located in its bottom center (Photos # E-19, E-2, E-3); two, black in color, palm push buttons, one on each side; a red colored emergency stop push button; a red colored ram power adjustment switch; and a Down Limit Indicator Light on its top (Photos # C-18, D-7).

6.3 A Warning sign is affixed to the press brake's ram (Photos # E-19, D-15).

6.4 Two triangular shaped signs, having black lettering on a yellow field and a pictogram of a hand with detached fingers, surrounded are affixed to the press brake's ram (Photos # D-16, E-19).

6.5 This press brake is equipped with a back gage that is adjustable from the front of the machine (Photos # E-19, red arrow; C-19, white arrow). The control module is equipped with a key-locked switch (Photos # C-19). A key was observed inserted in the lock (Photo # E-17); another was observed lying on its top (Photo # E-16).

6.6 Two instruction sheets are affixed to the ram in proximity to the Accurpress' Tonnage decal and gage (Photos E-19, A-1, A-4, A-5, D-21).

6.7 The press brake was operated in manual mode. Cycles were initiated. During its cycles, after the ram had cycled past the bottom of the stroke (bend point), the foot pedal was released, and re-depressed during its return (upstroke); initiating an immediate ram down stroke continuing through a full cycle.

6.8 The press brake was operated in automatic mode. Cycles were initiated. During its cycles, after the ram had cycled past the bottom of the stroke (bend point), the foot pedal was released, and re-depressed during its return (upstroke); initiating an immediate ram down stroke continuing through a full cycle.

6.9 A punch approximately 3 ½ inches long X 1 inch wide and a "V" die approximately 2 1/8 inches long X 1 ½ inches wide was installed in this press brake (Photo # F-20).

6.10 A chain was attached to the interior of the uprights in the rear of the press brake. One end is affixed to the frame's left upright (viewed from the front). The other end is attached to a removable connection plug mounted inside the frame's right upright. A Danger sign hangs from this chain (Photos # C-4, C-6, F-7, F-8).

6.11 The moveable remote operator control stand was positioned nominally against the front of the press brake (Photos # C-18, E-19).

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7.0 Discussion.

7.1 Press brakes are of a general class of fabricating machinery commonly utilized to bend metal piece-parts. Press brakes are available as manual (hand-brakes) or powered. There Powered press brakes are available in essentially three categories: mechanical, hydraulic and hydro-mechanical. The incident press brake is a hydraulic model.

7.2 The location within the press brake at which bending occurs is called the point-of-operation. Press brakes have a ram (slide) that moves vertically in order to bend the workpiece. The components installed in the press brake that press the workpiece during bending are referred to (as a unit) as the tooling. Press brake tooling typically consists of an upper component (punch) mounted in the ram, and a lower component (die) commonly mounted in a die holder in the press brake's bed, upon which the bottom of the workpiece rests. The punch and die typically are of a length, longer than the workpiece to be bent. Punches for bending are commonly have a cross section leading to a somewhat rounded point that contacts the work piece, in a line, at the interior of the bend angle. Dies for single angle bending are commonly in a V-shape, having two parallel linear top corners. The workpiece is placed on the die and the downward moving punch presses it in the center of the span between the parallel corners of the die.

7.3 The tooling and operation in this press brake at the time of this incident, was typical of press brake tooling and operations.

7.4 Hydraulic press brakes commonly utilize a motor-driven hydraulic pump to supply hydraulic fluid (oil) to hydraulic cylinder(s) that drive the ram. The cylinders can be directly connected to the ram, or connected through mechanical linkage. The incident press brake is of the latter design. A full machine cycle consists of the ram's descent of from its "UP" position, through the bottom of its stroke and return to its full "UP" position. This press brake's ram has a rapid speed setting for fast downward approach to the workpiece, a slower speed for the actual bending, and a rapid retract speed.

7.5 A dangerous hazard is present in a press brake's point-of-operation during bending. Body parts in the point-of-operation during bending, whether intended or not, are at risk of being injured. If they remain there once the stroke is initiated they are likely be injured. Without barriers preventing access into a press brake's point-of-operation, this dangerous area is usually freely accessible to operators.

7.6 Press brakes have been commonly equipped with foot-pedal control. Foot pedal control allows the operator's hands, fingers, etc. to be in the point-of-operation while his foot actuates the pedal. Foot pedal control requires operator coordination of hand and foot movements in order for operators to avoid serious, permanent debilitating injuries resulting from their hands, arms, etc., in the point-of-operation during actuation.

7.7 ANSI B15.1 is the American National Safety Standard for Mechanical Power Transmission Apparatus. In 1972 it stated:

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No employee, regardless of training, intelligence and intent can be 100 percent alert 100 percent of the time.¹

7.8 The pressures and tensions commonly found in the workday environment can result in distractions, momentary thoughtless, instinctive, reactions and/or inadvertent actions. It is well known and reasonably foreseeable that machine operators, regardless of training, intelligence and intent, are not necessarily completely cognizant of their tasks at all times. It is unreasonable to allow persons to suffer severe, permanently debilitating injuries as consequences for operator's momentary actions when technologically and economically feasible designs exist that can prevent such consequences.

7.9 Foot pedal control has been recognized as a hazardous control method that places operators at risk of severely debilitating, and permanent injuries. It has long been known that press brake operation by foot pedal control provides for actuation, whether intentional or inadvertent, while operators' hands are in the dangerous and hazardous point-of-operation. Dangerous hazards associated with inadvertent foot pedal actuation are well known. A number of foot switch manufacturers warn of the dangers of utilizing foot switches on machinery without safeguarding their dangerous point-of-operation hazards. See Attachments B-1, B-2 and B-3.

7.10 It is unreasonable to depend upon operator vigilance and skill for prevention of injury to body parts in the point-of-operation for foot-pedal controlled press brakes. Foot-pedal operated press brakes require safeguards so as to not jeopardize operators' body parts in the point-of-operation; whether they are there inadvertently or intentionally.

7.11 A number of safety improvements have been made to reduce inadvertent foot pedal actuations, including pedal covers, cover-guard front entrance flaps, and toe contact devices. These improvements help reduce inadvertent foot-pedal actuations, but do not eliminate them. They do not prevent a foot poised over a foot pedal from depressing it and actuating the ram's descent.

7.12 It is well known that operators place their fingers, hands etc. into the point of operation of press brakes, whether inadvertent or intentional, during inserting and removing workpieces. It is reasonably foreseeable that body parts will be within a press brake's dangerous point-of-operation. Press brakes require safeguards in order to protect such body parts from injury during operation. Safeguards for press brakes, such as controls configurations, fixed and moveable barrier guards, devices and light curtains have existed for considerable time.

7.13 Fixed barrier guards allow only the workpiece to enter the point-of-operation; they prevent body parts from entering the point-of-operation. Some moveable barrier guards and devices prevent machine actuation if an obstruction, e.g. body parts, prevents the guard from moving to its position that permits machine actuation. Restraints allow for operator hand movements, but prevent hands from entering the point-of-operation. Pull backs (devices) allow operator hands to enter the point-of-operation while the ram is in its up position and pull the hands out of it upon the ram's descent. See pages 308, 309, 312 and 313, Best's Safety-

¹ American Society of Mechanical Engineers, ANSI B15.1 – 1972, Safety Standard for Mechanical Power Transmission Apparatus, New York, 1972, p.7.

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Maintenance Directory, 11th Ed. (1966), attached. Power presses and press brakes functions are virtually the same, as are their safeguarding technologies.

7.14 A light curtain, positioned in front of the point-of-operation, prevents, or halts, the ram's descent if the beam is penetrated, such as by hands. Light (photoelectric) curtains were available and in use when the incident press brake was manufactured. See pages 312 and 316, Best's Safety-Maintenance Directory, 11th Ed. (1966), attached. Heinrich illustrated a General Electric "electric eye" safeguard in 1950.² U.S. Patent No. 2,241,556, filed in 1938, is for a photoelectrically controlled press. U.S. Patent No. 2,311,441, filed in 1941, is for a light beam safety device for presses and the like. U.S. Patent No. 4,166,369, filed in 1978, is for a light beam safety device for press brakes.

7.15 Press brake controls have been configured for hand actuation and foot actuation, and/or a combination of both. Two-hand control requires the operator to place each hand on a separate control button simultaneously in order to initiate bending motion. The buttons are located so that once the press brake is actuated the operator's hands cannot reach the dangerous point-of-operation before bending takes place. Two-hand control, by its simultaneous two-hand actuation requirement and location, precludes the operator's hands from being within the point-of-operation during actuation or reaching it after actuation.³

7.16 In 1955 The National Safety Council published the Hierarchy of Safety Controls.⁴ It is a statement of the order of priority of the steps to be put into effect in order to control the hazards of a manufactured product. Beginning with the highest priority and descending to the lowest, this hierarchy is:

1. Design the hazard(s) out of the product. If this is impractical then:
2. Guard the hazard(s). If this is impractical then:
3. Warn the user as to the product's dangers and instruct the user of the steps necessary to be taken in order to safeguard against its hazard(s).
4. If the hazard(s) still exist then personal protective equipment must be utilized.

This hierarchy is well accepted by safety professionals. At least 47 professionally recognized sources have been identified substantiating a consensus for this methodology for safeguarding dangerous, hazardous products.⁵

7.17 The National Safety Council stated in 1959:

A hazardous mechanical condition or exposure is one which has caused or could cause an injury. If a method of guarding such a condition is known, there is no valid

² Heinrich, H.W., *Industrial Accident Prevention A Scientific Approach*, McGraw-Hill Book Company, Inc., New York, 1950, p. 221.

³ Wilson, Frank W., Editor-in-Chief, *Tool Engineers Handbook*, American Society of Tool Engineers, McGraw-Hill, New York, 1949, pp. 1070-1072.

⁴ National Safety Council, *Accident Prevention Manual for Industrial Operations*, 3d Edition, Chicago, 1955, p. 4-1.

⁵ Barnett, Ralph A., Brickman, Dennis, "Safety Hierarchy" Triodyne Inc., Niles, Illinois, 1985.

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reason for not using it. Absence of injury from operating an unguarded or partially guarded machine for a period of time is no proof that the moving parts of the machine are not dangerous.⁶

7.18 Gilbert Marshall authored in 1982, a book for engineering students who will be designing facilities that will have an impact on the safety of working people. He stated:
... a designer should not regard a standard as a design goal. Rather, standards should be used as guides, and in most cases regarded as minimum, not optimum conditions.⁷

7.19 R. Mathew Seiden heads the Seiden Group, Inc., a safety-engineering, management and economics consulting firm. He wrote in 1984:

When an existing safety code or standard does not contain any provisions relating to certain reasonably foreseeable hazards, the burden is on *you*. Do not permit code limitations to stand in the way of designing, producing, and marketing a reasonably safe product, even if you don't like it.⁸

7.20 The National Safety Council wrote, in 1985:

The final component necessary to complete a functional press brake production system is the safeguarding means or component. Fundamental to this is a thorough hazard or job safety analysis for operator exposure, if any, created by considerations such as the tooling component and the feeding and removal of piece-parts at the point of operation.⁹

7.21 Accurpress designed and manufactured the incident press brake with both foot pedal control and two-hand push button control. Accurpress included in its design, a keyed selector switch for control modes. Control mode is changed while the key is in the switch's keyhole.

7.22 This Accurpress' Hand control mode, provides Two-Hand Control to safeguard its operator. The control can be changed from Hand to Foot actuation mode by simply placing the key in the switch and switching to Foot mode. The key can be removed and the control locked in the Foot mode, or it can be left in the switch and Hand or Foot mode selected to suit.

7.23 Industry experience has shown that keys for such control selector switches are commonly left in the switch, allowing operational personnel to freely select the mode suited to their convenience, expediency, habit, lack of understanding, whim, or other motives. Inspection Observation 6.5, above, is representative of this practice. A semicircular wear pattern centered on the selector switch key hole is observable in Photo # D-7.

⁶ National Safety Council, Accident Prevention Manual, Chicago, 1959, pp. 23-1, - 23-3.

⁷ Marshall, Gilbert, Safety Engineering, Brooks/Cole Div., Wadsworth, Belmont, 1982, p. v.

⁸ Seiden, PE, CSP, CPSM, R. Mathew, Product Safety Engineering for Managers, Prentice-Hall, Englewood Cliffs, 1984, p. 196.

⁹ National Safety Council, Press Brakes Data Sheet I-419-Rev. 85, Chicago, 1985, p. 2.

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7.24 The practice of leaving the key in the keyed selector switch is a reasonably foreseeable misuse that negates a keyed switch's safeguarding function. Accurpress knew, or should have known, that the keyed selector switch's safeguarding function was easily bypassed.

7.25 This press brake has none of the guards or devices required for safeguarding operators' body parts from being in its dangerous point-of-operation during Foot actuation. Accurpress knew, or should have known, that this press brake would be operated in the Foot pedal control mode and when so operated, lacked the design provisions necessary for safeguarding operators' body parts from its dangerous point-of-operation hazard. Accurpress' design of this press is defective as it provides for the utilization of the dangerous Foot actuation mode but fails to include the necessary safeguards.

7.26 At the time of this incident, Mustafa was bending steel pour stops for concrete application. Previously he had been bending steps. Frederick Bezler made the new set up for this change. Eliou fabricated steps from 11 gauge (approximately 1/8 inch thick) steel sheet. Eliou fabricated items from diamond plate steel. They utilized 3/16" and 1/4 " thick diamond plate (Bezler, pp. 53 - 54).

7.27 Mustafa testified that:

the incident material had little bumps as to not slip, to stop from sliding; anti-skid bumps on it *{i.e., diamond plate}* (p. 215);

the incident piece stuck to the ram as the ram rose after bending (pp. 207, 222, 223, 329);

he was following the metal (i.e. piece stuck to the ram) and it totally disrupted his work cycle (p. 323)

the metal sticking to the ram changed his whole vision of it; he was confused by this, it was unusual (p. 329),

he reached in instinctively for it (pp. 208, 223, 228),

the piece fell in back (pp. 208, 226), he followed it and touched it with both hands.

he does not remember removing his foot from inside the foot pedal and thought his foot remained there during the entire time the incident took place (p. 236),

7.28 It is known in the press brake industry that workpieces can become attached to the ram's tooling (and the ram itself), rise with the ram and fall. A number of factors, such as over-bending (Albrecht, p. 148), piece configurations, thickness irregularities and variations, multiple thicknesses, foreign substances on the work piece, workpiece defects, tooling flaws and failures, improper bend settings; can result in work pieces becoming attached to the ram and/or ram's tooling. It is reasonably foreseeable that workpieces may adhere to the ram.

7.29 Colin Dean Albrecht is an engineer who is the Manager of Research and Development for the manufacturer of Accurpress. He testified that that in both the manual and automatic control modes, that if the control is release and reapplied during the return stroke (upstroke),

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a new cycle's down-stroke will be initiated and the ram will descend (p. 126). Albrecht's testimony is consistent with Inspection Observations 6.7 and 6.8, above.

7.30 The foot pedal does not contain any feature that would prevent another stroke, whether during a return upstroke or after the ram reached the top of its stroke. Mustafa thinks his foot was inside the foot switch housing, on the foot pedal during this incident. It is my opinion that Mr. Mustafa inadvertently, and foreseeably, initiated the incident downstroke that crushed the areas of his wrists, with his foot, in essence during the time he was reaching for the workpiece falling behind the press brake's point-of-operation area.

7.31 Had Accurpress designed and manufactured this press brake without Foot pedal actuation and only Two-Hand controls, Mustafa could not have had his wrists in the point-of-operation and actuate its ram's descent on his wrists, by simultaneously actuate two hand buttons; the subsequent injuries would not have occurred. However, Accurpress chose a design that facilitated Foot pedal operation.

7.32 Had Accurpress's design not provided the means to by-pass Two-Hand controls and utilize foot-pedal control, Mustafa could not have had his wrists in the point-of-operation and simultaneously actuate the ram's descent with the foot pedal; the subsequent injuries would not have occurred. Accurpress knew, or should have known, that this press brake's keyed Foot/Hand mode selector switch facilitated the bypassing of its Two-Hand control safeguard. Accurpress knew, or should have known, that its keyed Foot/Hand mode selector switch is not sufficient to safeguard operators, such as Mustafa, from its dangerous point-of-operation hazards; its design must include adequate guards or devices in order to safeguard operators.

7.33 Accurpress knew, or should have known, that operators, such as Mustafa would operate the incident press brake in the Foot control mode. Accurpress, therefore, should have included the guards or devices necessary to safeguard Mustafa from this Foot pedal operated press brake's dangerous point-of-operation hazard in this press brake's design. However, Accurpress chose not include them. It is reasonably foreseeable that without such guards or devices operators will be exposed to this press brake's dangerous point-of-operation hazards, while operating in its Foot control mode. It is reasonably foreseeable that operators, such as Mustafa risk injury while operating this foot pedal controlled press brake.

7.34 Accurpress' design of the incident press is defective as it provides for the means to bypass its safeguard that would have prevented Mustafa's injuries. Accurpress' design of the incident press brake is unreasonably dangerous, as it unreasonably and unnecessarily exposes its operators to its dangerous point-of-operation hazards. A substantial cause of Mustafa's injuries is Accurpress' defective design that provided the means to bypass this press brake's safeguarding that would have prevented Mustafa's injuries.

7.35 Had Accurpress' design of this foot-pedal actuated press brake included a light curtain to safeguard Mr. Mustafa there is a substantial certainty that his injuries would not have occurred. The design of this Accurpress is defective as it fails to include a light curtain.

7.36 Had Accurpress designed and manufactured this foot-pedal actuated press brake with fixed or moveable barrier guards there is a substantial certainty that Mustafa's injuries would not have occurred. The design of this Accurpress is defective as it fails to include fixed or moveable barrier guards.

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7.37 Had Accurpress designed and manufactured this press brake with the provisions necessary to safeguard body parts in the point-of-operation when utilizing Foot pedal control, there is a substantial certainty that Mustafa's injuries would not have occurred. A significant cause of Mustafa's injuries is Accurpress' defective design of the incident press brake that failed to include provisions necessary to safeguard his wrists in the point-of-operation when utilizing Foot pedal control.

7.38 Frederick Bezler worked for Eliou since June 15, 1994. He operated the incident press brake. Bezler testified that he was never taught how to operate this press brake with the hand control buttons, and, to his knowledge, the hand control buttons were never used on this press brake (pp. 28, 29). He also testified that the key controlling the hand/foot selection switch was always left in the switch, in the foot position (p. 30). It was Eliou's practice prior to Mustafa's injuries to always operate the incident press brake in the Foot pedal control mode. Mustafa adhered to Eliou's practice.

7.39 Bezler testified that the press brake was being operated in the "regular" mode at the time of Mustafa's incident (p. 148). Bezler did not train Mustafa in the utilization of the hand control push buttons (Bezler, p. 82). Eliou should have trained Mustafa in the use of this machine's two-hand control push buttons, and should have allowed Mustafa to only operate the incident press brake with two hand control. Eliou's failure to properly train Mustafa is a cause of Mustafa's injuries.

7.40 It was standard operating procedure at Eliou for press brake operators to grasp the work pieces during bending in order to stabilize them when finished. Bezler showed Mustafa how to bend these pieces by bending two, himself. His demonstration included placing his hands on the piece as its bending was in progress (Bezler, pp. 68, 71, 72). Mustafa adhered to Eliou's practice by grasping the finished pieces with both hands. It is reasonably foreseeable that Mustafa would reach with both hands in order to retrieve a fallen workpiece.

7.41 A number of add-on modifications were made by Eliou to this press brake after its installation. They included a front mounted gage, lights for visibility and instructional papers affixed to the ram. It is reasonably foreseeable that the incident press brake will be so modified in the field with such features, as they are commonly added to press brakes.

7.42 Albrecht testified, in regard to these add-ons, that they could possibly reduce the safety of this machine by:

failure of the light during operation could distract the operator momentarily and he puts his hand in the wrong place, because he is not watching the work piece (p. 101);

the light could reflect off a shiny piece and distract him (pp. 102, 103, 149);

the hardware can fall, fixture can fall and hit him (p. 103);

papers falling off the ram could distract the operator (pp. 113, 149).

7.43 Accurpress knew that distractions can disrupt an operator's performance and be the impetus for injuries, such as those resulting from momentary, instinctive, operator reach-ins.

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Albrecht testified that anything that would distract the operator would certainly have a negative effect on the safety of this machine (p. 113). Accurpress knew, or should have known, that operators, such as Mustafa, need to be safeguarded from potentially severe, permanent, debilitating injuries that could result from distractions.

7.44 It is reasonably foreseeable that the distraction of a workpiece adhering to the ram could result in an operator inserting his hands into the press brake's point-of-operation and producing injuries. Accurpress knew, or should have known, that it must include features in the design of its press brakes that would safeguard operators from the severe, permanent, debilitating consequences resulting from distractions while operating in the Foot control mode. However, Accurpress failed to design this press brake with the guards or devices necessary to safeguard operator from injuries resulting from distractions while operating in Foot control mode.

7.45 Subtitle B of Title 29 of the Code of Federal Regulations is the Regulations Relating to Labor, commonly referred to as OSHA. Its authority was established in 1970 and requires those employers covered under this Act to provide a place of employment free from recognized hazards that are likely to cause serious harm to employees. OSHA regulations apply to this Accurpress at Eliou. § 212 (a)(3)(ii) of 29 CFR 1910 (OSHA regulations) requires that machines whose operation exposes employees to injury shall be guarded. § 212 (a)(3)(ii) of 29 CFR applies to the incident press brake.

7.46 OSHA's twenty year existence established it as an industry standard in 1990, the year this press brake was manufactured. OSHA lists fifty-two (52) Press Brake Accident Investigation Summaries on its website for the period between March 5, 1984 and October 24, 1990, approximately when the incident press brake was manufactured. The majority of them consisted of crushes and amputations of extremities in the point-of-operation.

7.47 Manufacturers of fabricating machinery having dangerous point-of-operation hazards know that in order to market their products they need to design and manufacture them in conformance with OSHA regulations. Accurpress' design of the incident press brake fails to include guarding of its dangerous point-of-operation hazard. Had Accurpress designed and manufactured the incident press brake in conformance with 29 CFR 1910 212 (a)(3)(ii) and provided it point-of-operation guarding, there is a substantial certainty that Mustafa's injuries would not have occurred.

7.48 Andrew Scopelitis is the vice president of Eliou. He testified that at the time of this incident, no one at Eliou had formal training in workplace safety (p. 27), and that no one in particular was responsible for OSHA compliance (p. 35)

7.49 New York State Code Rule 19 (12 NYCRR 19) was in effect at the time Accurpress designed and manufactured the incident press brake. It applied to this press brake. This Accurpress bends metal workpieces by pressing them. 12 NYCRR 19.8 required machines having a pressing motion (Eliou, pp. 115, 116) in which the operator's hand may come within the danger zone, to be guarded. Accurpress' design and manufacture of this press brake failed to comply with 12 NYCRR 19.8. Had Accurpress designed and manufactured this press brake in compliance with 12 NYCRR 19.8, there is a substantial certainty that Mustafa's injuries would not have occurred.

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7.50 The chain, connection plug and warning sign of Observation 6.10, above, was installed subsequent to this incident.

7.51 A manufacturer of machinery presenting potentially dangerous hazards in its utilization, such as this press brake, has a duty to warn of those dangerous hazards and instruct how to safely deal with them. Accurpress affixed a warning sign to this press brake's ram. It instructs to read the operators manual. The operator's manual should be stored on the press brake and tethered to it in order to facilitate this instruction. It was not.

7.52 Albrecht characterizes the control station's mobility as a safety feature. However, its mobility facilitates its placement in close proximity to the press brake's dangerous point-of-operation hazard. Its mobility facilitates simultaneously stepping on its foot pedal while reaching into its dangerous point-of-operation with both hands. Industry experience indicates that operators are likely to do what expedites press brake operations. Accurpress knew that this mobile control module can be placed in close proximity of this press brake so that it can be actuated by foot while pieces are handled in close proximity to its dangerous point-of-operation by hand. Accurpress' instructions and warning are inadequate. Accurpress neither place a sign on the machine itself, nor instructed in its manual, to not locate the control station within a distance of this press brake in which it can be foot actuated while an operator can reach into its dangerous point-of-operation.

7.53 Accurpress failed to warn of the various hazards associated with installing equipment not originally supplied by them it knew of, e.g. lights falling into tank, motor coupling, high voltage supplied to light bulbs causing bulbs to explode, electrical fires, operators tripping on component dropping and falling into the machine. Accurpress' warnings are inadequate.

7.54 Willie Hammer stated in 1976, with regard to warnings as identification of hazards:

There are numerous examples of its use, and misuse, since identification is often employed to point out the hazard instead of eliminating or minimizing it through improved design.¹⁰

7.55 Thorpe and Middendorf, of the University of Cincinnati's Engineering College, wrote in 1979, with regard to warnings:

It is naïve to believe that warnings are the solution to latent design defects.¹¹

7.56 Willie Hammer stated in 1993:

A warning label should not be used as a substitute for good design. The fact that a warning label has been placed on a piece of equipment is *prima facie* evidence that the manufacturer knew that a safety problem existed.¹²

¹⁰ Hammer, Willie, *Occupational Safety Management and Engineering*, Prentice-Hall, Inc., Englewood Cliffs, 1976, p. 135.

¹¹ Thorpe, James F., Middendorf, William H., *What Every Engineer Should Know About Product Liability*, Marcel Dekker, Inc., New York, 1979, p. 26.

¹² Hammer, Willie, *Product Safety Management and Engineering*, 2nd Ed., American Society of Safety Engineers, Des Plaines, 1993, p. 96.

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7.57 At the time of this incident Mr. Mustafa understood no English (Mustafa, p. 73). At the time of his depositions Mustafa understood and spoke a little English (Mustafa, p. 7).

7.58 The FMC Corporation produced a manual on safety signs. It has been well received by safety professionals and is referred to in OSHA regulations.¹³ The FMC manual states:

Written communication can be confusing. The same words can have different meanings to different people, especially when used in more than one context. Words can also become an inadequate means of communication when over used or misused. Disparities in reading skills and/or comprehension of a specific language complicate the effectiveness of written communication even further.

When words are used to help minimize the occurrence of accidents, the limitations associated with written words present serious communication problems.¹⁴

7.59 ANSI Z53.1-1979 is the American National Standard for Safety Color Code for Physical Hazards. It is a consensus standard that addresses the color coding of safety messages to alert and inform persons to take the appropriate action to avoid injury. ANSI Z53.1 stated in 1979:

The marking of a physical hazard by a standard color warning should never be accepted as a substitute for the reduction or elimination of this hazard whenever possible.¹⁵

7.60 Accurpress warned to not place body parts within the die area; to not operate this machine without adequate safeguarding; and to not extend fingers or hands beyond guard or barrier. However, Accurpress's design failed to include safeguards to prevent body parts from being in the die area, and guards or barriers preventing fingers or hands extending into the hazardous area, even though such safeguards, guards and barriers were technologically and economically feasible at the time they designed and manufactured this press brake. Accurpress cannot substitute warning sticker in place of technologically and economically feasible engineering designs in order to insure the safe use of this press brake. Accurpress cannot utilize warnings to compensate for its defective design.

7.61 It is my understanding that the transcript of the recent Deposition of Anthony Eliou may be forthcoming. I reserve the right to review the same and alter my opinions accordingly.

8.0 Opinion

Within the bounds of a reasonable degree of engineering certainty, based upon my engineering education, training and experience, the facts of this case, and subject to new information, it is my professional opinion that:

¹³ 29 CFR 1910.145(f), Appendix B 9.

¹⁴ Product Safety Sign and Label System, 3rd Edition/January 1980, FMC Corporation, Santa Clara, p.1-1.

¹⁵ American National Standards Institute, Safety Color Code for Physical Hazards, ANSI Z53.1-1979, New York, p. 5.

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8.1 Mustafa inadvertently and foreseeably, initiated the incident downstroke that crushed the areas of his wrists, with his foot that remained within the foot pedal housing, simultaneously as he reached for the workpiece falling behind the press brake's point-of-operation area.

8.2 Accurpress' design of the incident press is defective as it provides for the means to bypass its Two-Hand controls safeguard that would have prevented Mustafa's injuries.

8.3 Had Accurpress's design not provided the means to bypass Two-Hand controls safeguard, Mustafa's injuries would not have occurred.

8.4 A substantial cause of Mustafa's injuries is Accurpress' defective design of the incident press that provided the means to bypass its Two-Hand control safeguard that would have prevented Mustafa's injuries.

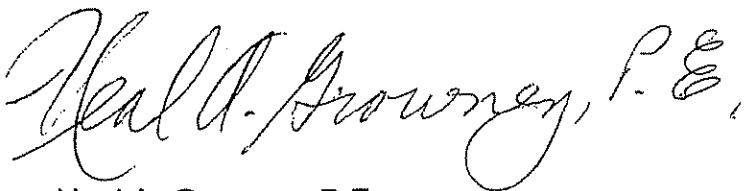
8.5 Accurpress' design of this foot-pedal actuated press brake is defective as it fails to include the guards or devices (e.g. light curtain, fixed or moveable guards, pull backs, restraints, etc.) necessary to safeguard Mustafa from its dangerous point-of-operation hazard when utilizing its Foot pedal.

8.6 Had Accurpress' design of this foot-pedal actuated press brake included the guards or devices necessary to safeguard Mustafa from its dangerous point-of-operation hazard when utilizing its Foot pedal, there is a substantial certainty that his injuries would not have occurred.

8.7 A substantial cause of Mustafa's injuries is Accurpress' defective design of the incident press that failed to included the guards or devices necessary to safeguard Mustafa from its dangerous point-of-operation hazard when utilizing its Foot pedal.

8.8 Accurpress' design of the incident press brake is unreasonably dangerous, as it unreasonably and unnecessarily exposes its operators to it dangerous point-of-operation hazards.

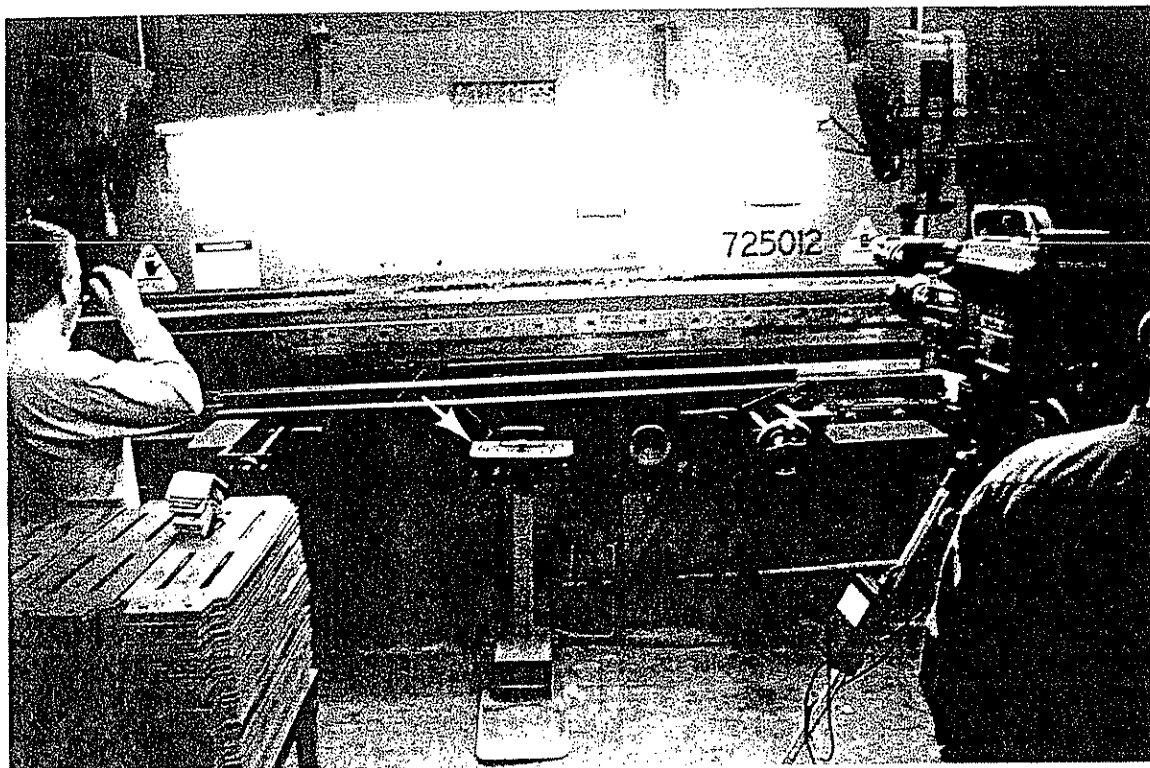
8.9 Accurpress' warnings are inadequate as it fails to warn of dangers operators are exposed to in utilizing this press brake's foot pedal operating mode.



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Photographs and Attachments

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E-19



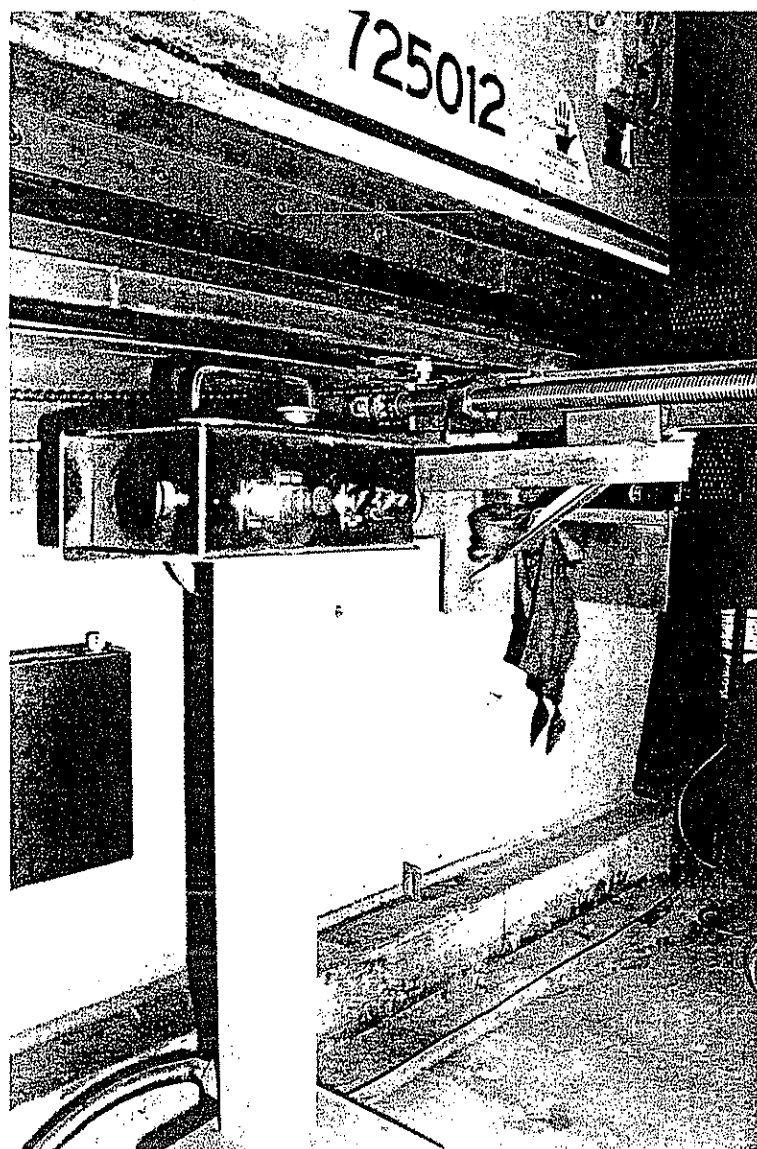
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725012
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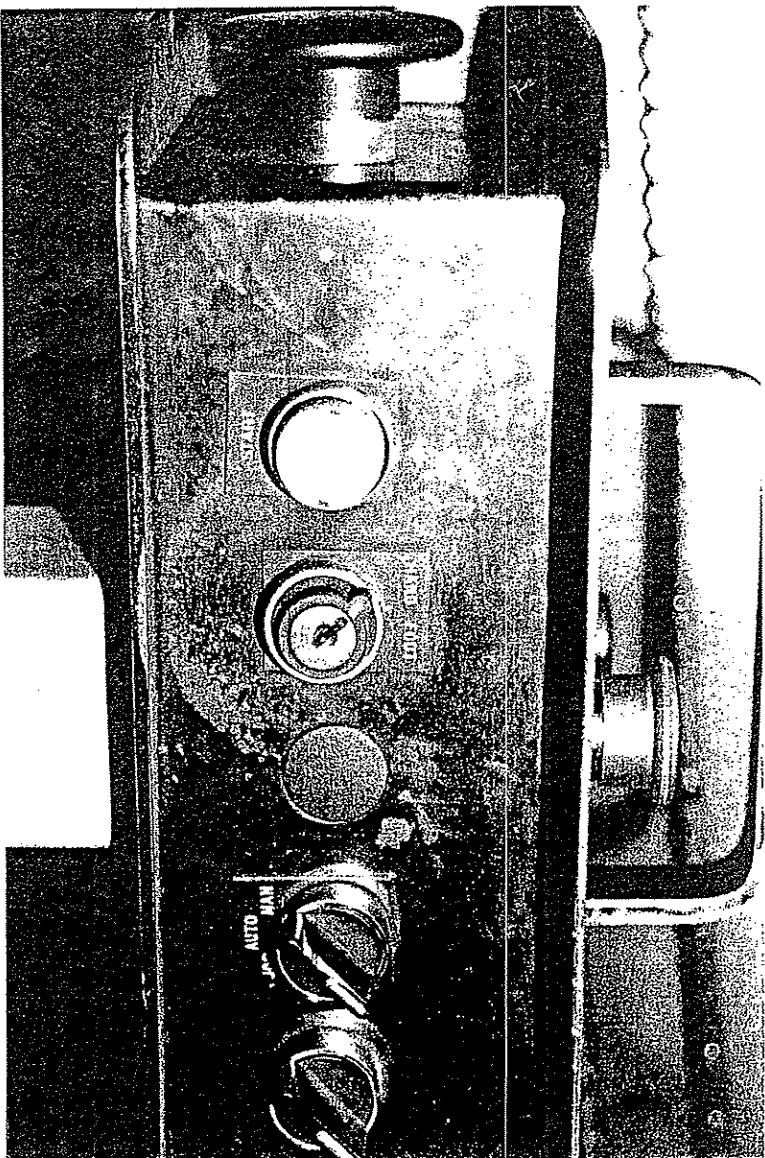
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PRINCESS ST. RICHMOND B.C.	
MODEL NO.	725012
SERIAL NO.	1710
TONNAGE	250
BED LENGTH	12
VOLTAGE 3 PHASE	230
CONTROL VOLTAGE	120
HYD. OIL PRESSURE	550
DATE OF MFG.	12-90
MADE IN CANADA	

D-2

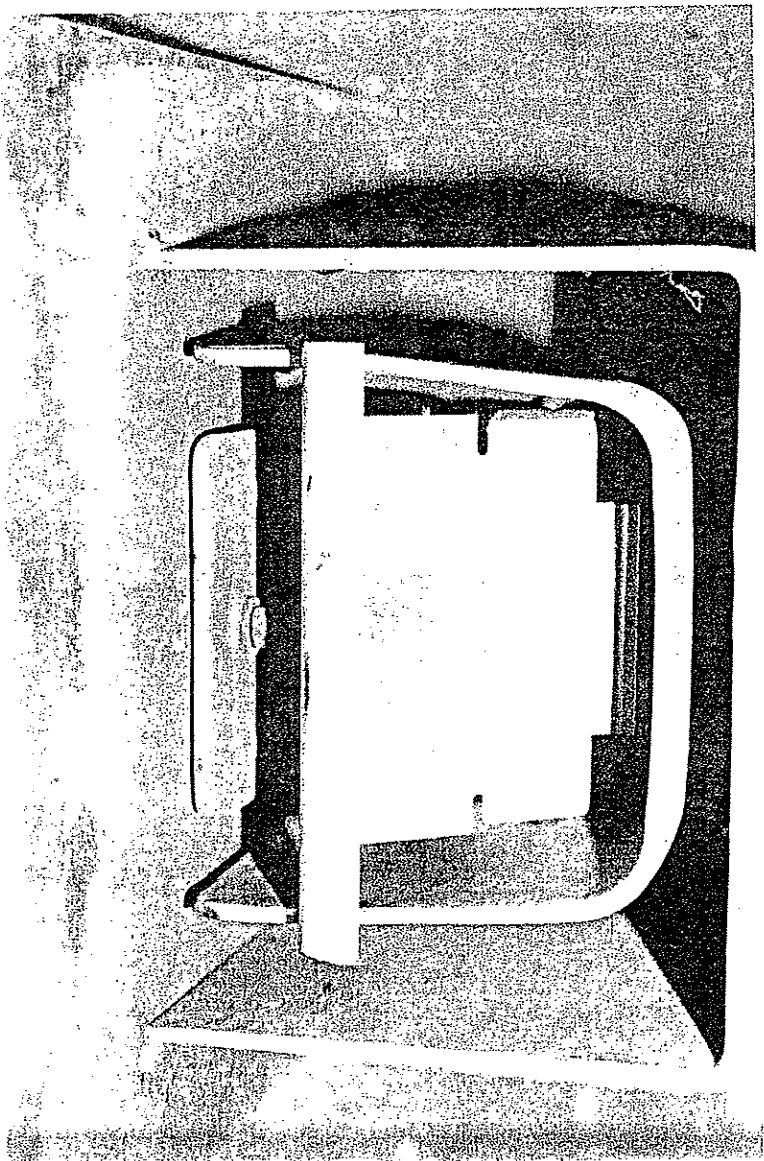


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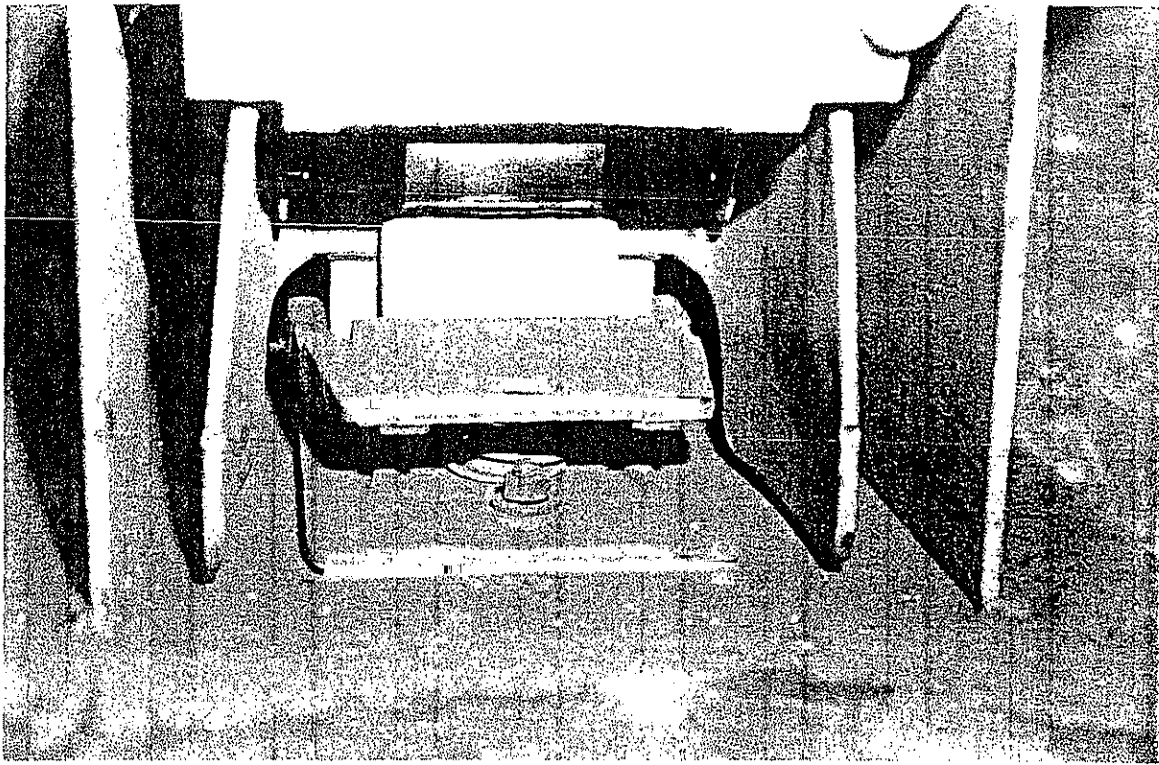


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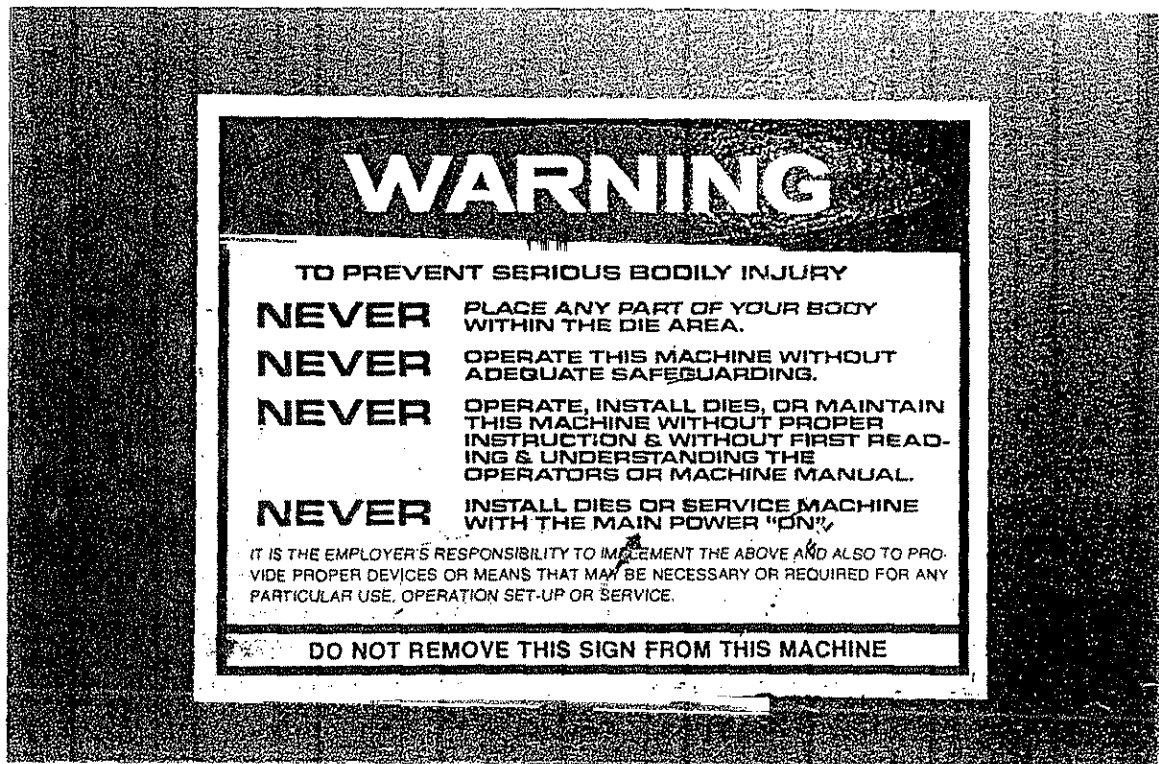


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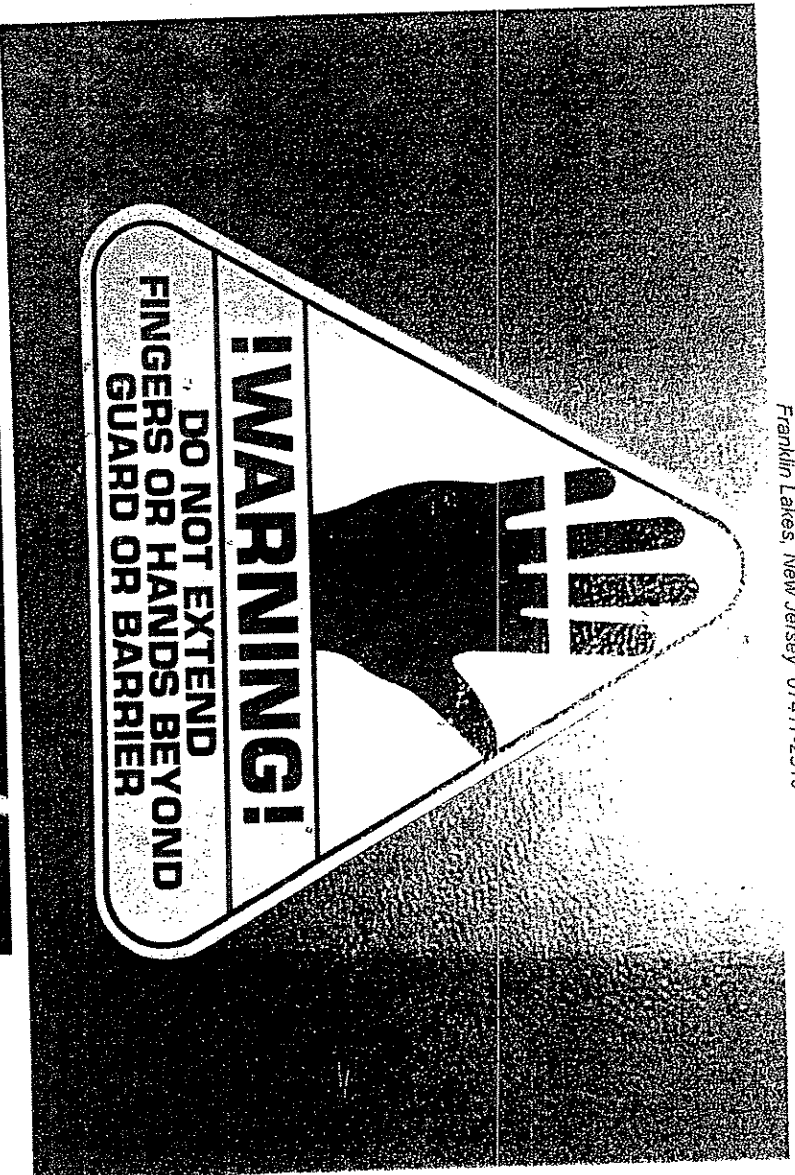


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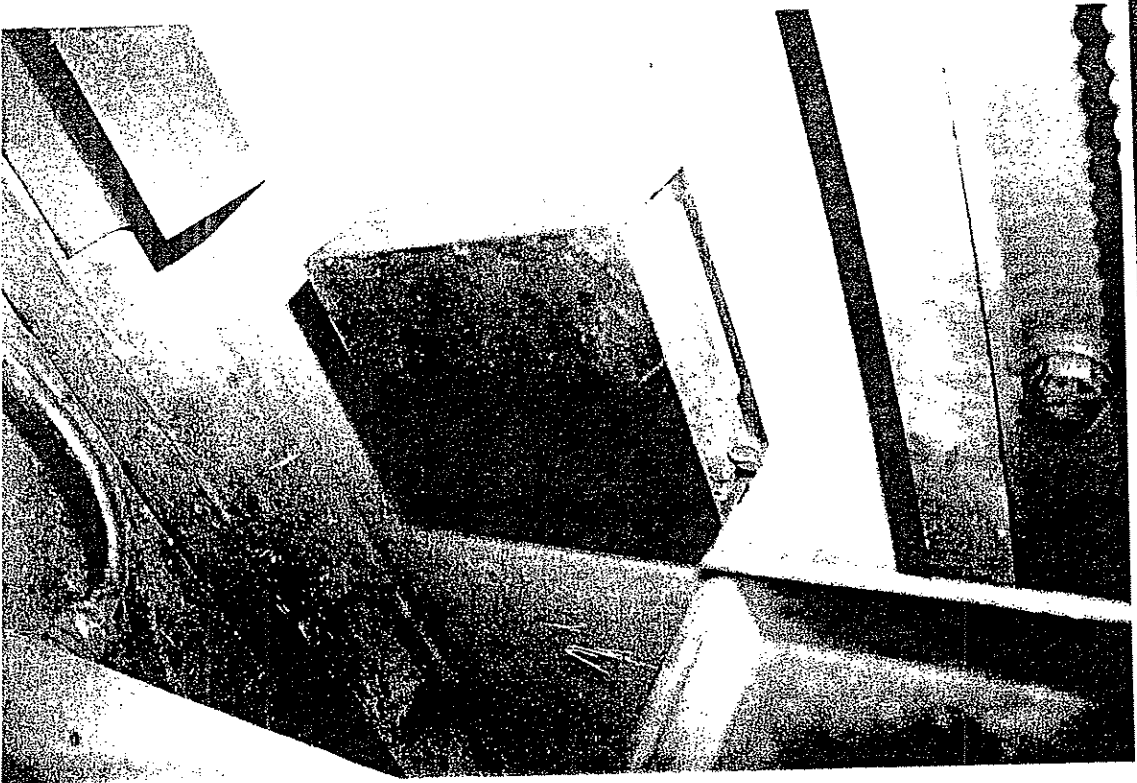


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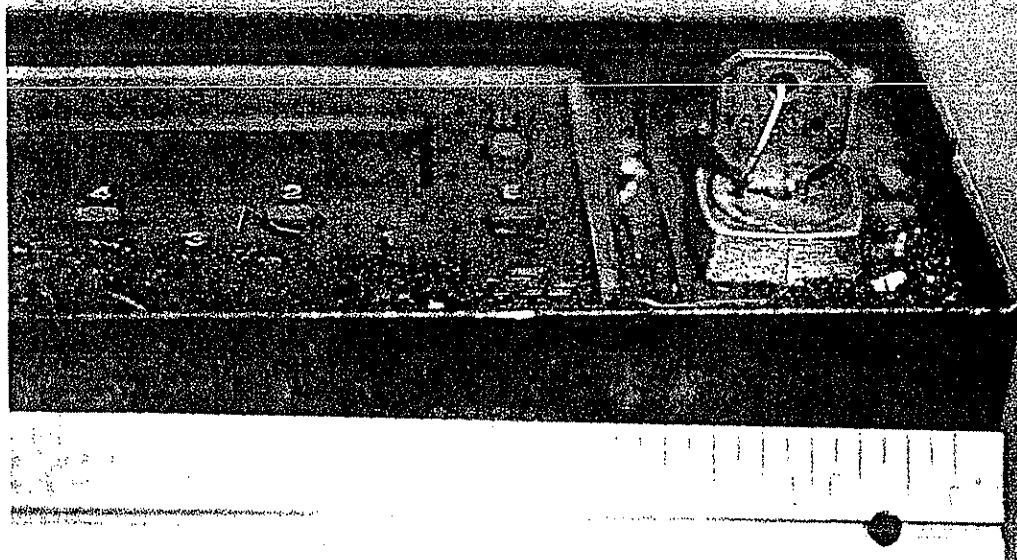
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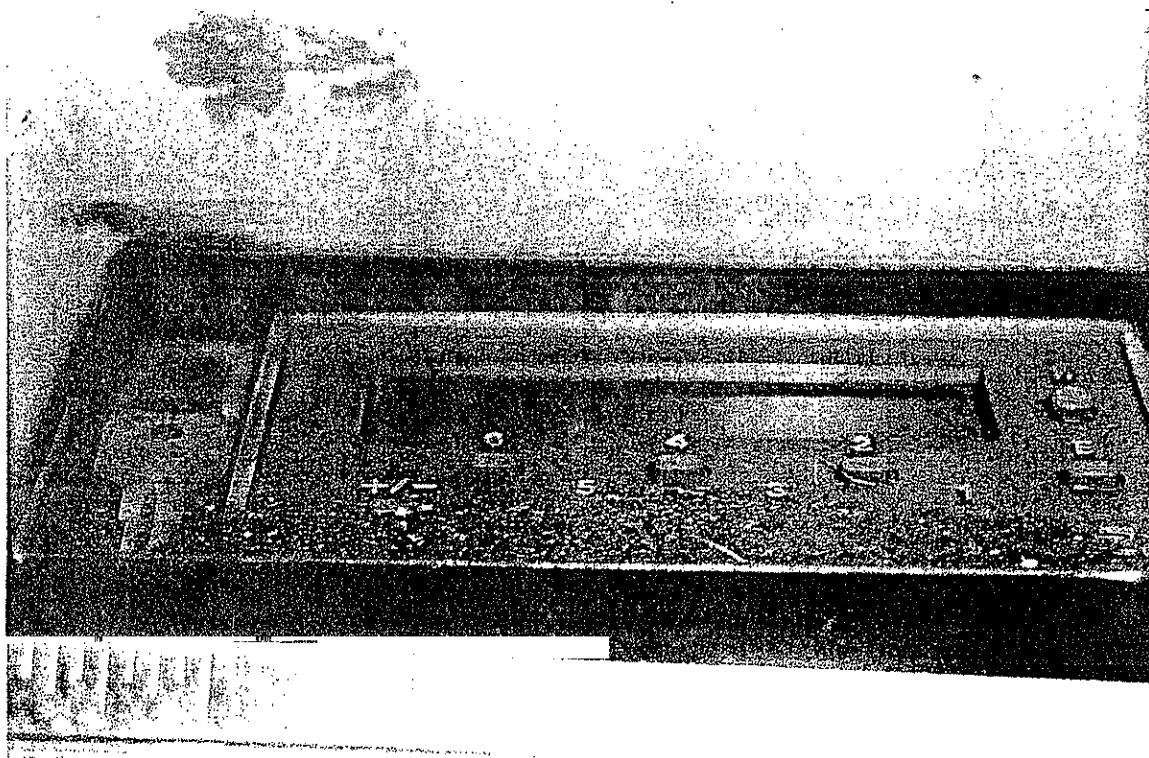
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E-17



E-16

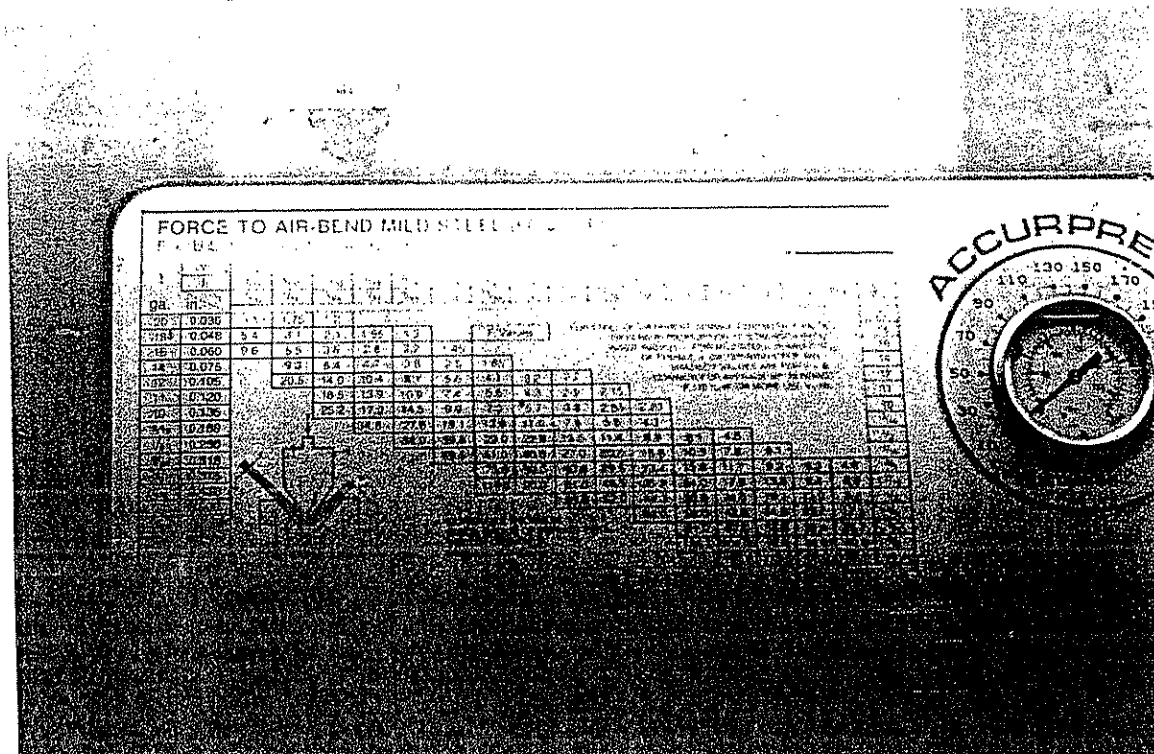


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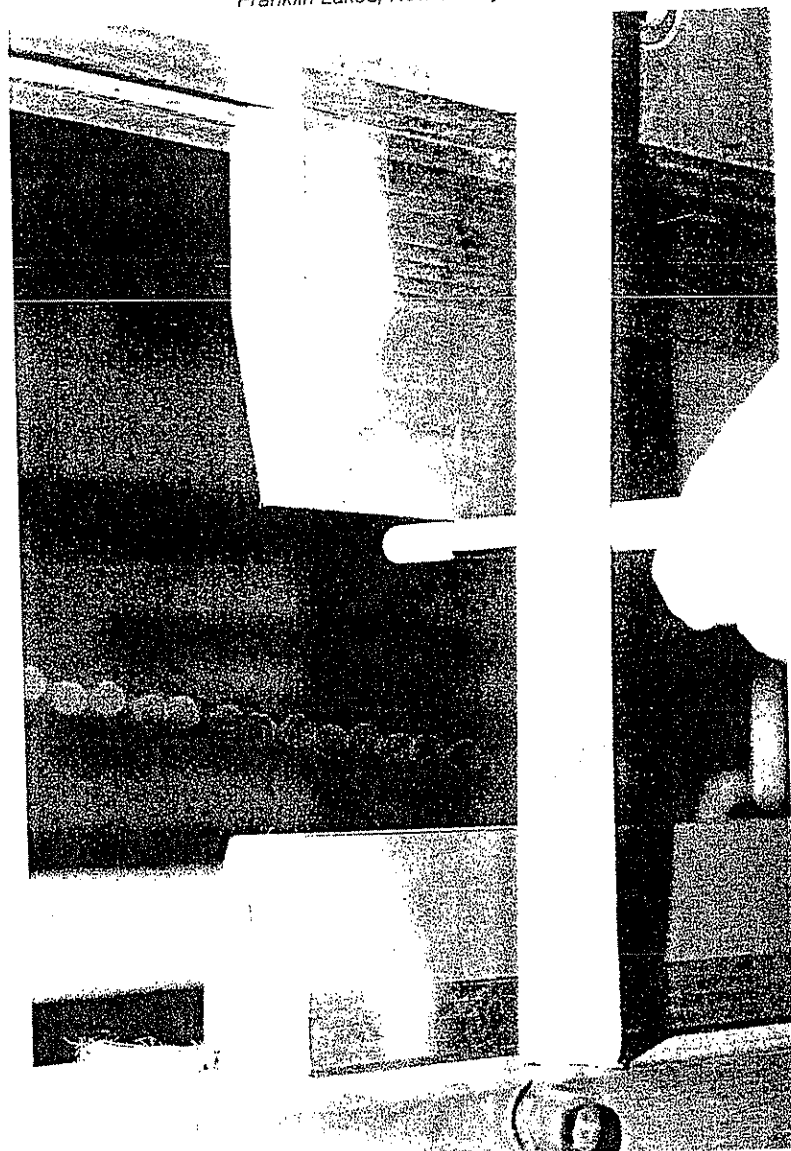
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Fractional Inch	Dec. Equiv.	Milli-meters	Fractional Inch	Dec. Equiv.	Milli-meters
1/64	.0156	.397	17/32	.5312	13.494
1/32	.0312	.794	35/64	.5469	13.891
3/64	.0469	1.191	9/16	.5625	14.288
1/16	.0625	1.588	37/64	.5781	14.684
5/64	.0781	1.984	7/12	.5833	14.817
1/12	.0833	2.117	19/32	.5938	15.081
3/32	.0938	2.381	3/5	.6000	15.240
1/10	.1000	2.540	39/64	.6094	15.478
7/64	.1094	2.778	5/8	.6250	15.875
1/8	.1250	3.175	41/64	.6406	16.272
9/64	.1406	3.572	21/32	.6562	16.669
1/5	.1600	4.033	2/3	.6667	16.933
11/64	.1719	4.366	43/64	.6719	17.066
3/16	.1875	4.763	11/16	.6875	17.463
1/5	.2000	5.080	7/10	.7000	17.780
13/64	.2031	5.159	45/64	.7031	17.859
7/32	.2188	5.556	23/32	.7188	18.256
15/64	.2344	5.953	47/64	.7344	18.653
1/4	.2500	6.350	3/4	.7500	19.050
17/64	.2656	6.747	49/64	.7656	19.447
9/32	.2812	7.144	25/32	.7812	19.844
19/64	.2969	7.541	51/64	.7969	20.241
3/10	.3000	7.620	4/5	.8000	20.320
5/16	.3125	7.937	13/16	.8125	20.638
1/3	.3333	8.467	53/64	.8281	21.034
11/32	.3438	8.731	5/6	.8333	21.167
23/64	.3594	9.128	27/32	.8438	21.431
3/8	.3750	9.525	55/64	.8594	21.828
25/64	.3906	9.922	7/8	.8750	22.225
2/5	.4000	10.160	57/64	.8906	22.622
13/32	.4062	10.319	9/10	.9000	22.860
5/12	.4167	10.583	29/32	.9062	23.019
27/64	.4219	10.716	11/12	.9167	23.283
7/16	.4375	11.112	59/64	.9219	23.416
29/64	.4531	11.509	15/16	.9375	23.813
15/32	.4688	11.906	61/64	.9531	24.209
31/64	.4844	12.303	31/32	.9688	24.606
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33/64	.5156	13.097	1"	1.0000	25.400

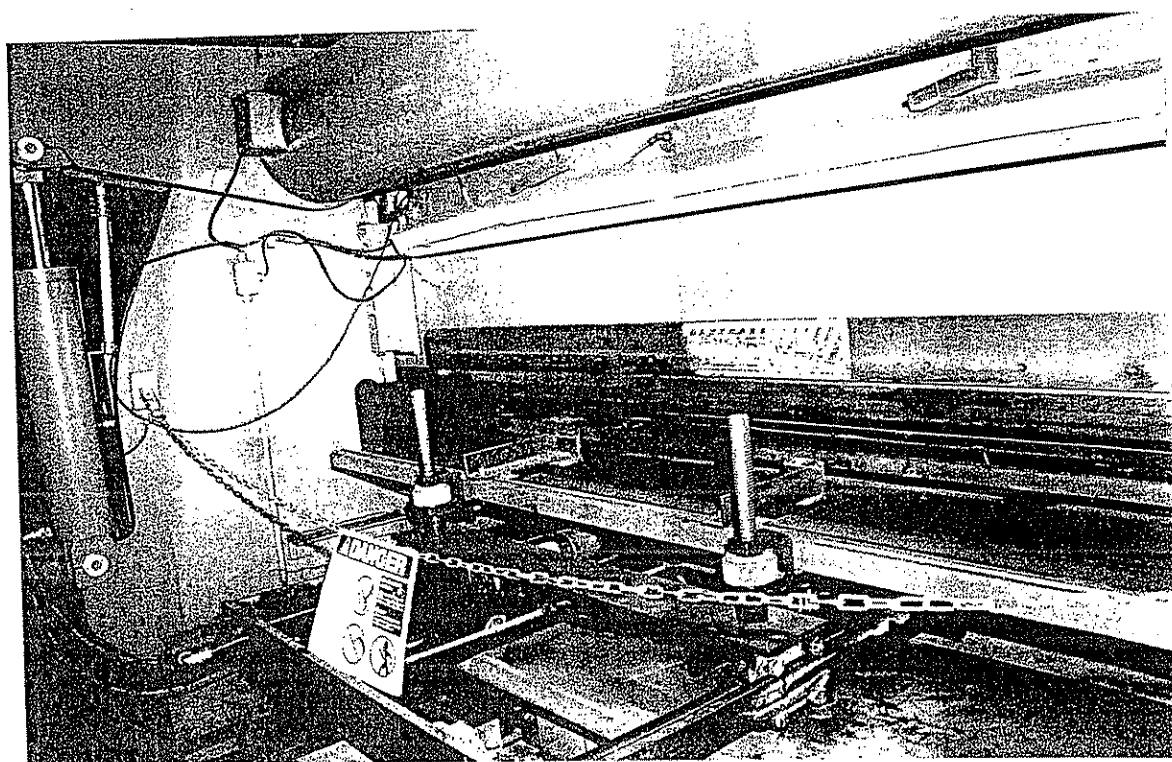
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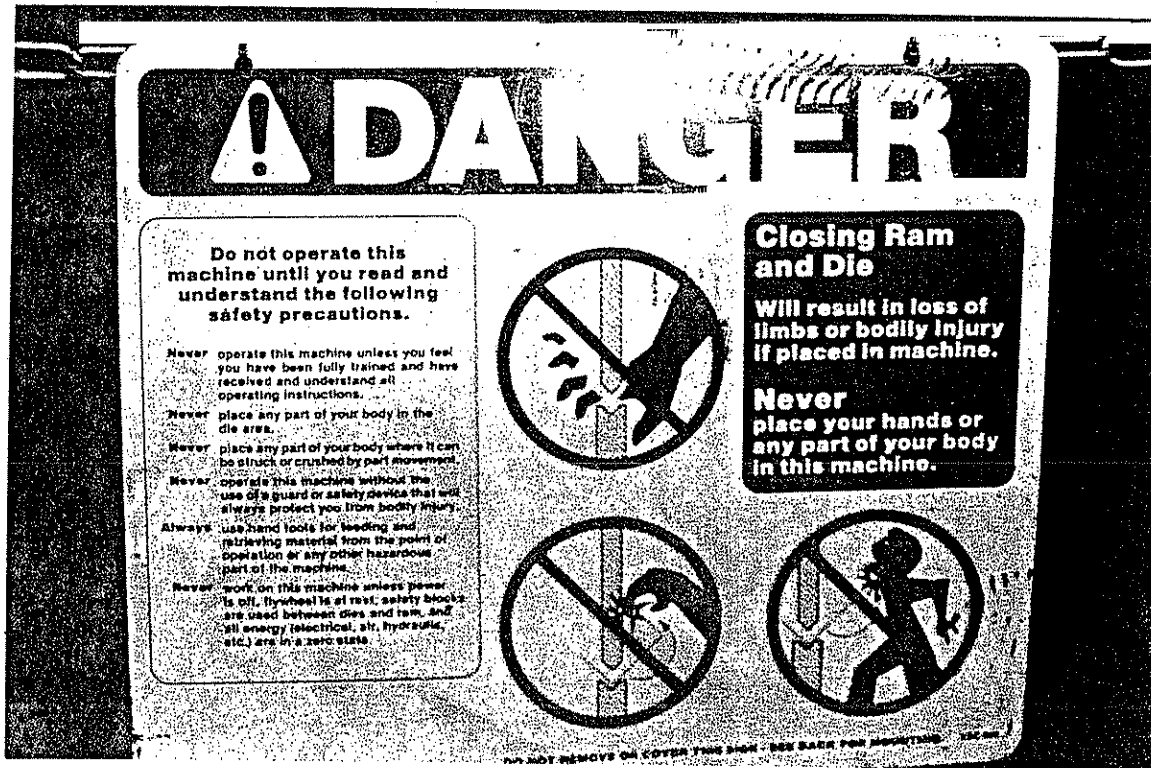
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Do not operate this machine until you read and understand the following safety precautions.

- Never** operate this machine unless you feel you have been fully trained and have received and understand all operating instructions.
- Never** place any part of your body in the die area.
- Never** place any part of your body where it can be struck or crushed by part movement.
- Never** operate this machine without the use of a guard or safety device that will always protect you from bodily injury.

F-7

- operating instructions.
- Never** place any part of your body in the die area.
- Never** place any part of your body where it can be struck or crushed by part movement.
- Never** operate this machine without the use of a guard or safety device that will always protect you from bodily injury.
- Always** use hand tools for feeding and retrieving material from the point of operation or any other hazardous part of the machine.
- Never** work on this machine unless power is off, flywheel is at rest, safety blocks are used between dies and ram, and all energy (electrical, air, hydraulic, etc.) are in a zero state.

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Neal A. Growney & Assoc., L.L.C.

**265 Steves Lane
Franklin Lakes, New Jersey 07417**

Phone: (201) 891-2768
Fax: (201) 891-2783

**Neal A. Growney, P.E.
Mechanical Engineer**

Investigations, technical analysis, research, reports and testimony on: industrial, construction, commercial and workplace accidents to property, equipment and persons. Experienced in design, installation, startup, safe operation, maintenance, modification, upgrade and repair of industrial machinery, equipment, systems. Operation and repair of construction machinery.

Accidents relating to Manufacturing: Documentation, standards, methods, procedures.

Materials: specifications, selection, testing. Training, operations, processes, production and safety. Repairs and maintenance.

Manufacturing Processes: Metal stamping, shearing, slitting, cutting, sawing, bending, forming, riveting, grinding, milling, drilling, tapping, roll forming, forging, heat treating, soldering, welding, fabrications, assembling, erecting, degreasing, polishing, buffing, tumbling, finishing, plating, painting, mixing, extruding, calendaring, drying, palletizing, filling, bagging.

Accidents relating to Machine Design: Guarding: point-of-operation, pinch points, inrunning nips, power transmission guarding. Controls: fail-safe, interlocks, component failure. Products. Instructions and warnings.

Material Handling: Raw material, in-process, finished goods, shipping, receiving. Truck unloading and loading, dock plates, pallet jacks, carts, hand trucks, forklifts, overhead hoists, monorails, storage racks, lifts, jacks, garbage trucks.

Machinery: Industrial - forklifts, power presses, press brakes, shears, roll formers, feed reels and cradles, tooling, dies, fixtures, steels, pull backs, sweep guards, gate devices, forge hammers and presses, ovens, dryers, furnaces, gas generators, lead pots, induction and resistance heaters, grinders, drills, tappers, saws, lathes, milling machines, boring mills, planers, shapers, buffers, tumbling barrels, vibratory finishers, shot blasters, wheelabrators, parts washers, de-greasers, sludge separators, plating machines, rectifiers, silos, gates, chutes, conveyors, bucket elevators, shaker screens, fans, blowers, dust collectors, bag houses, bin vents, scrubbers, precipitators, sprockets, chain drives, V-belts drives, slings, chains, wire ropes, valves, mixers, controllers, feeders, packers, sealers, palletizers, scales, shrink wrappers, compressors, pumps, gearmotors, reducers, mills, extruders, calendars, ladders, racks, platforms, railings, strut, metal framing systems, pipe hangers, cable trays, concrete inserts, welders, torches, hand and power tools, pneumatic conveying systems, pressurized containers.

Construction - forklifts, log stackers, log splitters, stump grinders, loaders, back hoes, scrapers, hoists, cranes, conveyors, compressors, pumps, welders, torches, generators, lifts, ladders, scaffolds, hand and power tools.

Safety: OSHA - codes, standards, training, inspections, personal protective equipment, confined space permits, fall protection, Material Safety Data Sheets (MSDS), Hazardous Materials Communications (Hazcom), emergency evacuation plans, hearing conservation, sound level measurements, warning signs, railings.

Fire Protection: Installations, code conformance, inspections, repairs, upgrades. Operations: wet and dry sprinklers, CO2, dry powder, Halon systems. SCBA, valves, doors.

Buildings: Industrial and commercial construction, maintenance, repairs, alterations, inspections, code conformance, egress, security. Gas, electric, water, plumbing, heating, HVAC, utilities.

Regulatory Compliance: DOT drivers' logs, Environmental Pollution Control permits.

Neal A. Growney & Assoc., L.L.C.

265 Steves Lane

Franklin Lakes, New Jersey 07417

(201) 891-2768

Neal A. Growney, P.E.

Mechanical Engineer

- 2000 **Neal A. Growney & Assoc., L.L.C.** Forensic Engineers
to **Manager**
Current Provide technical support for the resolution of litigation involving mechanical and industrial engineering questions.
- 1996 **Robson Lapina, Inc.** Forensic Engineers
to **Associate**
2000 Provide technical support for the resolution of litigation involving mechanical and industrial engineering questions.
- 1994 **Tri-State Quikrete** Dry Packaged Concrete Mix Manufacturer
to **General Manager**
1995 *Operations:* Oversee all efforts including: production, purchasing, materials, quality, personnel, safety, training, Bi-lingual communications, environmental, DOT regulatory compliance, equipment installations, maintenance, repairs and distribution. Two shifts, 5 1/2 days, including in-house and contract truckers.
Training: Forklift Driver, Emergency Evacuation, Confined Space, Lock Out/Tag Out, and First Aid, equipment startup.
Safety: Specified safety equipment, procedures, inspections, and communications. Installed machine guarding, two-hand operator controls, upgraded exhaust venting, railings, ladders and platforms; upgraded electrical disconnects for code conformance. Administered: hearing, respirator and pre-employment testing; substance abuse policy.
Machinery Installations: Palletizer, compressor, air dryer, belt and chain conveyors, weighing scales, shaker screens, bin vents, pneumatic conveyors.
- 1977 **Versabar Corporation** Metal Framing Systems Manufacturer
to **Vice President of Engineering**
1994 *Engineering:* All engineering functions; methods; standards; quality assurance; equipment specifications and installations, engineering documentation for catalogs, design and maintenance of tooling, wrote claims for U.S. Patent of a concrete insert. Installed, power presses, a roll forming line, hoists.
Administered Underwriter's Laboratory (UL®) compliance program.
Facilities: Designed production layout and building alterations to accommodate layout. Oversaw alterations, electrical upgrades and repairs.
Safety: Directed OSHA. Designed, implemented: Power press, hoist and lifting sling inspections; Lock Out/Tag Out; Material Safety Data Sheets; NJ Right-To-Know.
Machine Guarding - designed, specified and oversaw the installation of: point of operation guarding, including barriers and presence sensing (light beam) device; power transmission guarding. Specified and installed safety signs.
Products: Designed, developed, specified, tested and produced new products including: Riveted back-to-back channels, support brackets for cable trays, cast aluminum splices,

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new fittings, prepainted, stainless steel and custom parts.

Manufacturing: Directed: scheduling, production, receiving and shipping.

Processes included roll forming, stamping, punching, forming, welding, parent metal riveting, drilling, tapping, sawing and assembling of: carbon, stainless, pre-painted and galvanized steel, and aluminum, products.

Standard: Participated in the writing of the first metal framing industry standard:

The Metal Framing Manufacturers Association Standard, MFMA-1.

- 1976 **The Pantesote Company** Vinyl Plastic Manufacturer
to **Project Engineer**
1977 Provided engineering for facilities improvements, equipment installations, material handling and environmental control projects.
- 1969 **J. Wiss & Sons Company** Cutlery Manufacturer
to **Assistant Plant Engineer**
1976 Provided engineering services for factory and office operations, equipment installations, maintenance and repairs. Supervised electric, gas, water, oil, sewer utilities, and fire protection systems. Oversaw generation of endothermic gas and HVAC operations.
Facilities: Construction, repairs and alterations of heavy metalworking manufacturing plants and office facilities, including: HVAC, exhaust systems and pollution control.
Machinery and Equipment: Designed, specified and oversaw the installation, repair, maintenance of production equipment, and fabrication of repair parts. Equipment included: Power Presses, Forge hammers and press, electric induction and resistance heaters, heat-treating furnaces, pots and ovens, industrial washers, grinders, buffers, vibratory finishers, central grinding cooling systems.
Fire Protection: Wet and dry sprinklers; CO2, dry powder systems; emergency egress.
Safety: Chairman – Corporate Safety Committee, OSHA, Factory Mutual and Compensation Insurer safety inspections. Administered Supervisor's Safety Training Program. Design, fabricate, specify and supervise installations of machine guards and devices for production equipment including: barrier guards, Possons Pullbacks, class "A" gates for power presses. Hearing conservation, personal protective equipment.
Environmental: Equipment: baghouse dust collectors, cyclones, oil mist separators, freon collectors, coolant clarifiers, sludge separators, electrostatic separators, smoke monitors. State and federal pollution control permits.
Industry Associations: Delegate to The Forging Industry Association, and The Hand Tools Institute.
- 1974 **Newark College of Engineering** - Part Time
Adjunct Professor
- 1969 **Hewitt-Robbins, Inc.** Bulk Material Conveyor Manufacturer
Design Engineer
Design structural and process components, subassemblies and complete bulk material conveyor systems.
- 1968 **Orange & Rockland Utilities, Inc.** Electric and Gas Utility
to **Associate Engineer**
1969 Inspection of power plant construction for conformance to plans and specifications.
Project engineer for a water main to power plant. Capital budget calculations.

———— *Neal A. Growney & Assoc., L.L.C.* ————

1964 to 1968	Bell Eastern Corporation Field Service Technician Service and repair of: hydraulic and mechanical backhoes, cranes and forklifts; LeTourneau diesel/electric earthmovers, loaders, log-stackers and forklift trucks. Member, International Union of Operating Engineers.	Construction Equipment Dealer
Also	Samplemaker, small consumer appliance motors- Electro-mechanical aircraft instrument technician- Spot welder- Electric motor repair shop handyman- Parcel post and mail, delivery & pick up- Diesel/electric generator test technician-	Brevel Products Corp. Bendix Corp. Ford Motor Co. C.V. Hunt, Inc. U.S. Post Office. International Fermont Corp.

Standards Committees:

ANSI O1.1, Safety Requirements for Woodworking Machinery, Alternate.
ANSI B65/NAPIM 177.1, Three-roller Printing Ink Mills, and; ANSI B65/NAPIM 177.2,
Printing Ink Vertical Post Mixers; Revision Review Lists.
MFMA-1, Metal Framing Standards Publication – Metal Framing Manufacturers Association.

License:

New Jersey Professional Engineer's License, # 20092.
New York City Fire Department Certificate of Fitness, G-95.

Education:

B.S., Mechanical Engineering - Graduate Management Certificate - Supervisors Safety Program - New Jersey State Fire College - Industrial and Commercial Power Distribution - Roll Forming Systems - LeTourneau Construction Equipment Service - Lift Truck Operator, Train-the-Trainer - Occupational Hearing Conservation -	Newark College of Engineering William Paterson College New Jersey Manufacturers Insurance Company New Jersey State Safety Council The Electrification Council Fabricating Manufacturers Association R.G. LeTourneau New Jersey State Safety Council The Council for Accreditation in Occupational Hearing Conservation
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Academic Honors:

The National Mechanical Engineering Honor Fraternity, *Pi Tau Sigma*.

Professional Associations:

American Society of Mechanical Engineers
American Society of Safety Engineers
American Welding Society
Society of Automotive Engineers
Human Factors and Ergonomics Society
National Safety Council

Publications:

"Safety Introduction", The Accurate Table Saw. Co-authored with Ian Kirby and Les Winter,
P.E., Cambium Press, 1998.
Bridgewood TSC-10C Table Saw Instruction Manual. Co-authored with Ian Kirby and Les
Winter, P.E., 1998.

Form 572-F70 Rev. B

WARNING

USE OF FOOT CONTROLS ON MACHINERY LACKING EFFECTIVE POINT OF OPERATION SAFEGUARDS CAN CAUSE SERIOUS INJURY TO THE OPERATOR. Foot controls should only be used where "Point of Operation" and "Pinch Point" guarding devices have been properly installed and are utilized so that it is IMPOSSIBLE for the operator's hands or fingers to remain within the point of operation during the machine cycle.

IT IS THE RESPONSIBILITY OF THE USER to determine the suitability of a foot control for the user's intended use and to determine that the foot control chosen by the user and wiring up and installation of same will comply with all Federal, State and Local safety and health regulations and codes.

Due to the unlimited variety of business equipment, instruments, machines and vehicles on which our foot switches are used, the thousands of standards, and customers' varying interpretations of the standards covering these applications, it is impossible for LINEMASTER personnel to be experts on standards and requirements for all these products. We offer over 150 stock foot switch models and guards plus a large variety of specials which are made to customer specifications. We can advise you what is available in our foot switch line and you can examine models to see what meets your needs. We believe our customers' engineering departments should be the qualified experts in their own product field and know what specifications or details they may require in a foot switch for their equipment. If one of our stock models meets their needs, they can specify it, or possibly ask for a modification of a stock model if that is required.

SHOULD YOU HAVE ANY QUESTIONS OR IF ANY OF THE ABOVE WARNING IS UNCLEAR, PLEASE CALL LINEMASTER SWITCH CORPORATION.
(800) 974-1000; FAX (800) 974-0661 or (800) 974-3668.

READ INSTRUCTIONS on reverse side of this page.

DEFINITIONS:

POINT OF OPERATION - The point or area of the machine or equipment where the work piece or material is actually positioned and work is being performed during any process such as cutting, shearing, punching, forming, welding, riveting, assembling, etc..

PINCH POINT - Any point at which it is possible for a portion of the body to be caught and injured between moving machine or equipment or work piece parts.

91-2701-CS7#



AMERICAN FOOT SWITCH LEADER

MODEL NO.
632-S

POUR ÉVITER LE DOMMAGE À SOI-MÊME,
N'EMPLOYEZ PAS CET INTERRUPTEUR AVEC
LES MACHINES QUI ONT UN POINT
D'OPÉRATION QUI N'EST PAS GARDE.

TO AVOID PERSONAL INJURY, DO NOT USE
THIS SWITCH ON MACHINERY WITH AN
UNGUARDED POINT OF OPERATION.

PARA EVITAR DAÑOS CORPORALES, NO
USE ESTE INTERRUPTOR EN MAQUINARIA
CON UN PUNTO INDEFENSO DE FUNCION-
AMIENTO.

Attachment B-2

CLIPPER FOOT SWITCH

WIRING

1. **WARNING: TO AVOID PERSONAL INJURY, DO NOT USE THIS SWITCH ON MACHINERY WITH AN UNGUARDED POINT OF OPERATION.**
2. **READ WARNING STATEMENT** on reverse side of this page.
3. When wiring up this device make sure **POWER IS OFF AND LINES ARE DEAD.**
3. Loosen or remove cable clamp screws; remove baseplate; insert cable and connect inner leads of cable to appropriate switch terminals.

Check orientation of cable clamp for proper cable size range and re-tighten cable clamp screws (See Diagram "A").

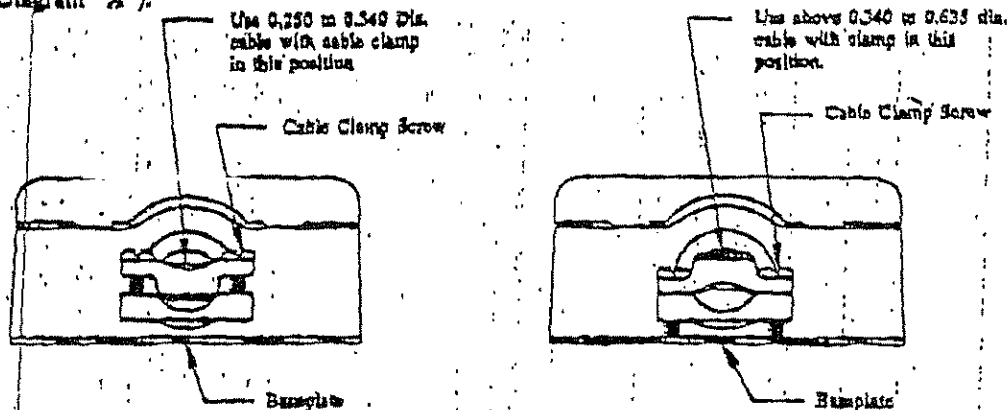


DIAGRAM "A"

4. Re-assemble baseplate.
5. **CLEANLINESS** must be observed during installation and in use.

On a **REGULAR BASIS** inspect foot switch frequently to guard against wear, damage, unlawful alterations, or removal of guards, or for unusual enclosure deterioration and the like. Inspect the entire length of the connecting cord (or wiring system) from where it enters the foot switch to the equipment it's wired up to for wear, loose strain relief connections and the like. **DO NOT OPERATE** the foot switch if any of the above is observed or if the nameplate or warning label has been obscured or removed.

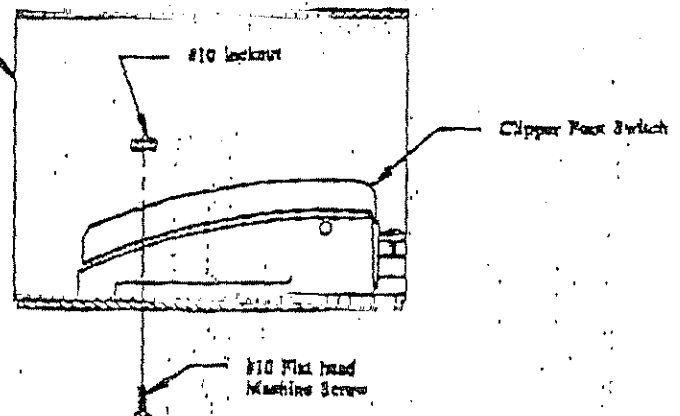
It is **IMPERATIVE** that inspection authorities and users exercise more than ordinary care with regard to installation and maintenance and that this information sheet be made available to the end user, operators, maintenance personnel and to others responsible for the proper installation and safe operation of this foot switch.

ADDITIONAL COPIES of this information sheet and warning labels are available upon request.

MOUNTING

1. Clipper foot switches are furnished with two 7/32 inch diameter mounting holes on 2-7/8 inch centers.
2. Use two number 10 machine screws and two number 10 lock nuts when mounting foot switch to full guard. (See Diagram "B").

#522-B14 Full Guard with assembly hardware and instructions available upon request



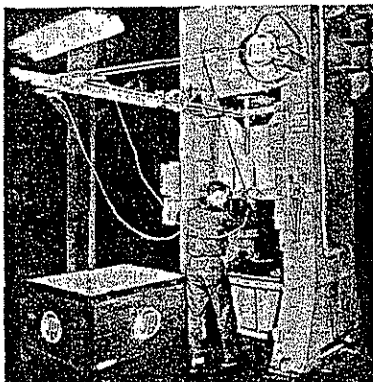
NOTE: For Twin Models use #522-B12 Full Guard

DIAGRAM "B"

POWER PRESS GUARDS

The power press guards are arranged in the following general order:

Hand-Controlling Devices (pages 308-309)
 Enclosure Guards (pages 309-310)
 Interlocked Guards (pages 310-311)
 Treadle Guard (page 311)
 Electromagnetic & Photoelectric Guards (pages 311-312)
 Press Brake Plastic Guard (page 312)
 Mufflers, Guide Pin Covers, & Safety Blocks (pages 312-313)



GUARD—POWER PRESS—HAND PULLOUT AND RESTRAINT

Pullout guards provide positive hand protection for press operators by synchronization with the down stroke of the ram. The device consists of wrist bands to which cords from a ram-controlled pulling mechanism are attached. If the operator forgets to remove his hands from the die block, they are automatically pulled back from the danger zone. The pullout safeguards against the possibility of injury from repeat action of the press. To provide full clearance in aisles, models with the slide column mounted overhead in a horizontal position or directly on the press are available. Similar hand holdback guards, used where the worker never needs to reach into the danger zone, require no synchronization with the press.

HAND PULLOUT GUARD

*POSITIVE SAFETY MFG. CO., THE, 1055 E. 134th St., Cleveland, OH 44110
 *SAFEGUARD MFG. CO., Woodbury, CT 06798

HAND HOLDBACK GUARD

*POSITIVE SAFETY MFG. CO., THE, 1055 E. 134th St., Cleveland, OH 44110

GUARD POWER PRESS—SWEEP

Sweep guards for power and foot presses are designed to force the operator's hand away from the die block during the downward stroke of the ram. The device consists of a padded rod which swings on a pivot at the top of the press. Controlled by the ram cycle, the guard sweeps back and forth across the front of the die, forcibly drawing the operator's hand to one side. A small shield which trails the sweep-arm discourages attempts to work back of the guard or to get hands into the press after the stroke has started. Adjustable to various heights and distances from die block, and to right- or left-handed persons. Double sweep guards have two rods which sweep from the point of operation outwards in both directions.

*JOHN HUMM SAFETY EQUIPMENT CORP., 249 Sheffield Ave., Brooklyn, NY 11207

Other Sources: (For addresses, see Source Index)

Cooper Weymouth Inc.

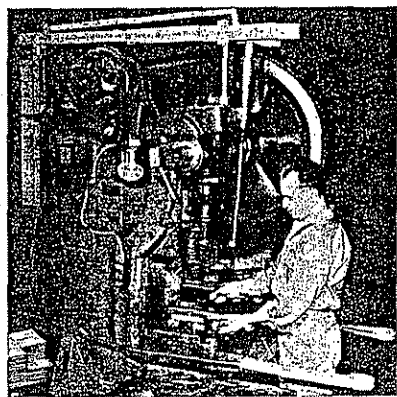
Shur-Safety Mfg. Co.

D & M Guard Co.

Wiesman Mfg. Co. Inc.

Globe Products Corp.

Searjeant Metal Products Inc.



Model E—Pullout Guard for highest possible production with safety

You can benefit from a safety program that pays for itself in increased production.

Models E & J are the ultimate in modern pullout guard design.

They allow the fastest possible hand feeding of a punch press.

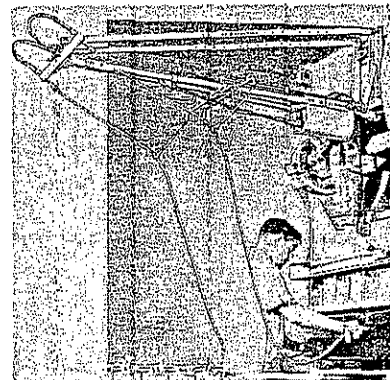
Their positive action provides real safety—even from press repeats.



Adjustable Enclosures with or without permanently transparent "Permasite" Panels

Safeguard Adjustable Enclosures are of an unique design for flexibility and ease of adjustment.

With the E and J Pullout Guards for secondary operations plus the Adjustable Enclosures for primary operations, Safeguard can offer you a complete press room safety program—all from one company.



Model J Pullout Guard for maximum freedom to handle large parts

Why not call Safeguard and discuss the possibilities in Your plant?

Write or call collect.

SAFEGUARD MANUFACTURING CO.

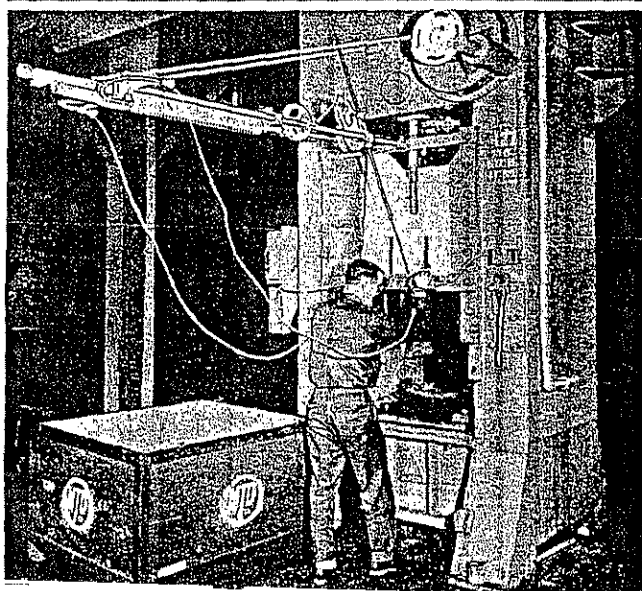
WOODBURY, CONNECTICUT

Area Code 203 Phone 263-3385

Circle # 117 on Reader's Card.

*See Advertisement & Index to Distributors.

POSSONS PULL-BACK SAFETY DEVICES



POSSONS H-O HORIZONTAL-OVERHEAD SAFETY DEVICE

Installed overhead, horizontally, on large presses or press brakes. Can be attached to a superstructure on small presses. Clears aisles. Lift trucks can deliver dies directly to the bolster. Operator has maximum freedom of movement for handling large work pieces.

For punch, toggle, embossing presses... drop hammers, press brakes, welders



POSSONS Press-Mounted Safety Device. Main column is mounted on rear of press.



POSSONS Floor-Mounted Safety Device. Main column is at operator's back.

Pull-back principle has been proven in over 43,000 POSSONS Safety Devices. Protect punch press operators, encourage faster production.

POSSONS  SAFETY

THE POSITIVE SAFETY MANUFACTURING CO.
1055 EAST 134th STREET • CLEVELAND, OHIO 44110
216-851-8686

In Canada: SAFETY SUPPLY COMPANY • TORONTO, ONT.

Circle # 118 on Reader's Card.

GUARD—POWER PRESS—BARRIER & SWEEP

A barrier guard with a sweep feature in emergency operation. This device has adjustable side shields and a front shield carried by a sweep arm which is not actuated by the ram or crankshaft in normal operations. For primary work, the front shield is locked closed and along with the side shields forms an enclosure of the die area. For secondary work, in normal operations, depressing the foot pedal moves the front shield into a locked position, and automatically trips the press. In the event of malfunction, clutch failure or repeats, a mechanical connection between the arm carrying the front shield and the crankshaft causes the shield to sweep through the danger area before the ram is half way down.

*JOHN HUMM SAFETY EQUIPMENT CORP., 249 Sheffield Ave
Brooklyn, NY 11207

Other Sources: (For addresses, see Source Index)

Durant Tool Co.

Searjeant Metal Products Inc.

Luther Mfg. Co. Inc.

GUARD—POWER PRESS—BARRIER DIE

Barrier die guards have the advantage of being permanently attached to the die itself. They enclose the hazardous point-of-operation area by means of vertical steel rods, perforated metal or heavy plastic. These guards can be used on any operation where the hands do not have to be placed between the punch and the die. Properly designed die guards should be attached to the

die shoe or stripper and should not permit the operator to reach over, under or around the guard.

*JOHN HUMM SAFETY EQUIPMENT CORP., 249 Sheffield Ave.,
Brooklyn, NY 11207

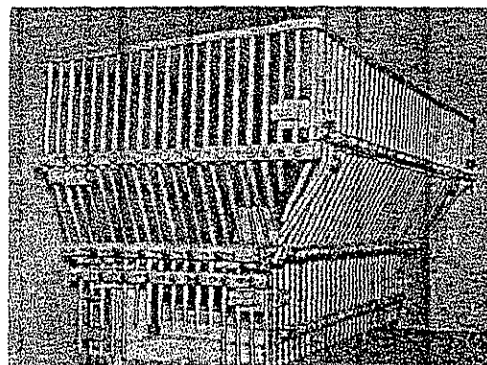
*JUNKIN SAFETY APPLIANCE CO., 3121 Millers Lane, Louisville,
KY 40216

*SAFEGUARD MFG. CO., Woodbury, CT 06798

Other Sources: (For addresses, see Source Index)

Rowland Products Inc.

Searjeant Metal Products Inc.



GUARD—POWER PRESS—BARRIER—FIXED

Fixed barrier guards are suitable for long-run production. The guard, consisting of steel rods, perforated metal or heavy plastic, encloses the point-of-operation area so that the operator's hands cannot enter the danger zone.

OVERLOAD PROTECTORS

(For addresses, see Source Index)

Security Controls Inc. (N.Y.)
Tiptronic Inc.

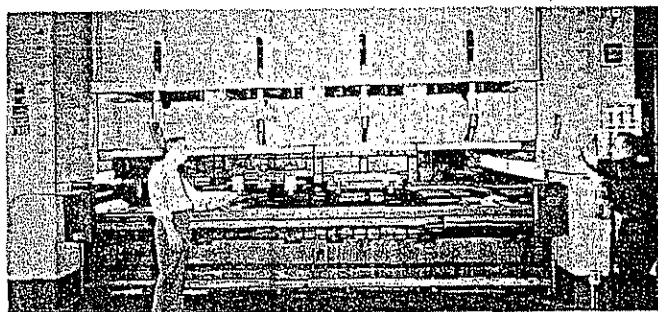
Wintriss Controls

EJECTION GUARDS

(For addresses, see Source Index)

De-Tec-Tronic Corp.
Security Controls Inc. (N.Y.)

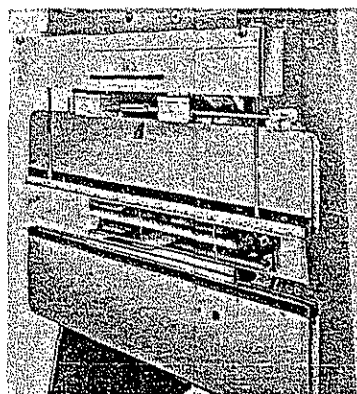
Wintriss Controls

**GUARD—POWER PRESS—PHOTOELECTRIC**

Photoelectric controls can be used as safety guards on power presses provided that the light beams are wide enough to cover the danger zone and the equipment also stops the press in the event the device itself fails. This type of guard can be adapted to large and small presses and does not create a physical barrier to hand movements and feeding operations. A wide beam of light is trained across the danger zone. Should the operator obstruct any part of this light during the closing stroke, the press stops and prevents injury. The press should be of the type which can stop quickly during any part of the closing stroke; it should have electrical control elements and should, as a rule, hold the work so that it does not overhang into the feeding area. (See: Guard—Photoelectric—Machine)

★ELECTRONIC CONTROL CORP., 15341 Dale Ave., Detroit, MI 48223

Other Sources: (For addresses, see Source Index)

Autotron Inc.
Cutler-Hammer Inc.
De-Tec-Tronic Corp.Photomation Inc.
Photobell Co. Inc.
Wintriss Controls**GUARD—PRESS BRAKE—TRANSPARENT BARRIER**

The transparent guard allows the work to be seen but prevents hands from entering the danger area. One model is attached to the ram by means of a hinge. As the ram descends, the leading edge of the guard pushes hands away from the die area. Interlocked guards cycle with the ram, allowing insufficient clearance for finger entry during the stroke, but providing free access to the die area at other times.

HINGED BARRIER GUARD

★JOHN HUMM SAFETY EQUIPMENT CORP., 249 Sheffield Ave., Brooklyn, NY 11207

INTERLOCKED BARRIER GUARD

★L. M. LIND ENGINEERING, 4432 N. Kedzie Ave., Chicago, IL 60625

MUFFLER—POWER PRESS

These mufflers can be placed on air operated power presses without interfering with press operation. The extended escape area minimizes exhaust air blast, virtually eliminating oil fog and water spray. It helps protect the operator from the hazards of noise and from injury by exhaust air or flying pipe scale.

★ALLIED WITAN CO. INC., 12500 Bellaire Rd., Cleveland, OH 44135

Other Source: (For address, see Source Index)

Ross Operating Valve

Wide-Area "Electric Eye" Guards Machine Operators



● A wide-beam form of the familiar photo-electric relay spreads a "curtain of light" in front of machinery danger zones . . . When an operator's hand penetrates this light screen, the machine stops instantly.

● The control device is inherently foolproof and "fail-safe" . . . If any part of its electronic circuitry fails, the press or shear stops . . . Unit helps boost production by allowing the operator freedom of movement.

● CURTAIN OF LIGHT is the only "electric eye" specifically designed for guarding presses, brakes, shears . . . Easily installed . . . No maintenance problems . . . Many different sizes available.

Send for bulletin and application data.

ELECTRONIC CONTROL CORPORATION

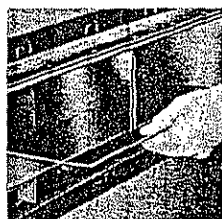
15341 DALE, DETROIT, MICHIGAN 48223
KENWOOD 3-6219

Circle # 122 on Reader's Card.

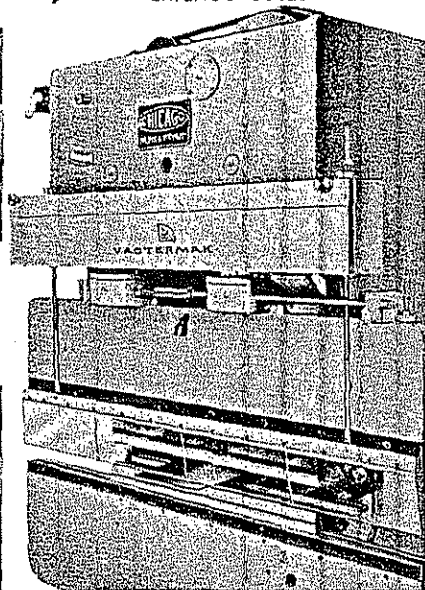
VACTERMAK CLEAR GUARD POSITIVE PROTECTION FOR PRESS BRAKE OPERATORS

If anything raises the CLEAR GUARD protective shield as little as 1/16", the downward stroke of the punch is stopped instantly. Bottom edge of shield may be positioned as little as 1/8" above the forming material. Press won't operate until shield is in safety position.

L. M. Lind, Engr. 4432 N. KEDZIE AVE.
CHICAGO 60625

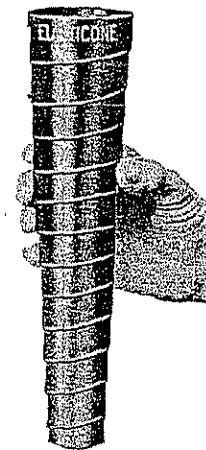


Shield stays in protective position (above) until punch strikes work piece, then retracts out of way (below).



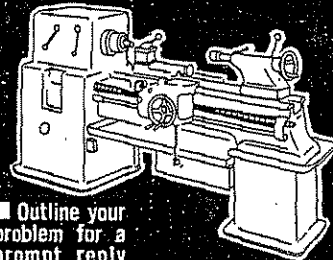
Circle # 123 on Reader's Card.

A NEW COVER IDEA



■ PREVENT BREAKDOWNS and jamming of precision components by sealing-out dirt, grime, welding spatter... and preserve lubricants with metal formed ELASTICONE COVERS!

■ Elasticones "cover-up" lead screws, shafts, pins and bushings, rams, etc., increasing equipment working life... preventing injuries to workers. Wide range of sizes and finishes can be specified for horizontal or vertical use on OEM parts and production tools!



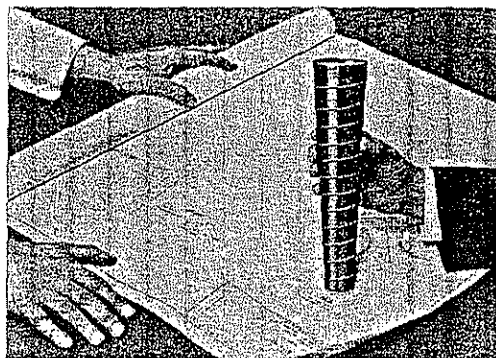
■ Outline your problem for a prompt reply or send for complete literature!

FOR UNCOVERED PROBLEMS

ELASTICONE DIVISION
CENTRAL SAFETY EQUIPMENT CO.,

MARSDEN AND MAGEE
PHILADELPHIA, PA. 19135
Phone (215) 333-4788

Circle # 124 on Reader's Card.



GUIDE PIN COVER

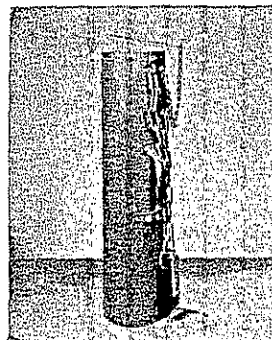
Guide pin covers eliminate nip point between pin and bushing on punch press die sets. They are helically wound, flat steel springs, which are inserted over the pin and bushing, between the shoes of the die set, and are held in place by their own spring action. Besides eliminating the nip point, the cover protects the pins and bushings from

nicks and scratches and from undue wear caused by dust and dirt adhering to the pin lubricant. Stainless or bronze models are available for special purposes.

★CENTRAL SAFETY EQUIPMENT CO., Marsden & Magee Sts., Philadelphia, PA 19135

Other Source: (For address, see Source Index)

Wiesman Mfg. Co. Inc.



SAFETY BLOCK—POWER PRESS

A block which is inserted under the ram of power presses to permit the operator to change dies and make new set-ups. Prevents the ram from accidentally descending while operator is in the danger zone. Available in various shapes and sizes and may have a power cutoff feature when placed in position.

Magline Inc.

Please mention

Best's Safety-Maintenance Directory
when ordering

INTERLOCK—ELECTRIC—DOOR

Installed on electrical enclosures, interlocks prevents access to equipment when circuits are energized. **RECOMMENDED USES:** As a positive safeguard against contact with a live controller or power source.

(For addresses, see Source Index)

Cutler-Hammer Inc.

Hoffman Engineering Co.

MONITOR—AUTOMATICALLY CONTROLLED PROCESSES

These monitors are designed to control temperature and electrical variables in automatic processing equipment. They can be used to control overspeed, overload, pressure weight, radiation level, etc., either by warning or actual shut-off. **RECOMMENDED USES:** Various models are suitable for automatic mixers, extrusion machines, presses, motor speeds, plating processes, battery charging, cutting and machine operations, etc.

(For addresses, see Source Index)

Foxboro Company

Tiptronic Inc.

Gulton Industries Inc.

Wintriss Controls

Reliable Products Mfg. Co.

GUARD—OVERLOAD—TORQUE

This device monitors the continuous operation of machinery and shuts down associated equipment if it stops or slows unusually. Without this protection, a minor breakdown in one machine may result in costly damage to automatic feeders, etc. The overload guard is usually linked at a fixed rate to a continuously-rotating shaft. Motion stoppage is transmitted electrically, hydraulically or mechanically to a cutoff switch. **RECOMMENDED USE:** To safeguard automatic machinery systems when individual components break down.

★ELECTRONIC CONTROL CORP., 15341 Dale Ave., Detroit, MI 48223

Other Sources: (For addresses, see Source Index)

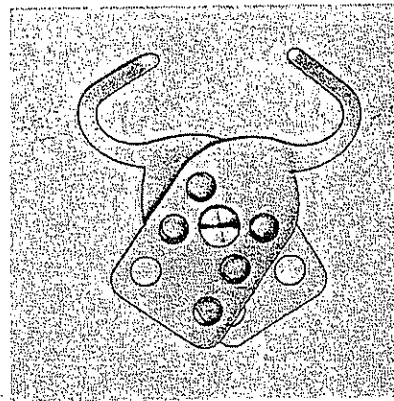
Cutler-Hammer Inc.

Valley Metal Works Inc.

Tiptronic Inc.

**LOCKOUT—MULTIPLE—SWITCHES & VALVES**

A device to eliminate the danger that a repairman may throw a machine's electric control switch or operate a valve while others are servicing the same equipment. The simple device consists of two pieces of formed steel which lock out the switchbox and contain matching holes to accommo-



date several padlocks. A padlock for each repairman is then inserted in the matching holes. The switch level cannot be operated until all the repairmen have removed their personal padlocks. **RECOMMENDED USES:** A positive means of preventing operation of processes or machinery under repair.

★HAZARD CONTROLS INC., 8127 Holman Ave., Delair, NJ 08110

★INDUSTRIAL PRODUCTS CO., 2805 N. Fourth St., Philadelphia, PA 19133

★OSBORN MFG. CORP., Box 271, Warsaw, IN 46580

Other Sources: (For addresses, see Source Index)

Cutler-Hammer Inc.

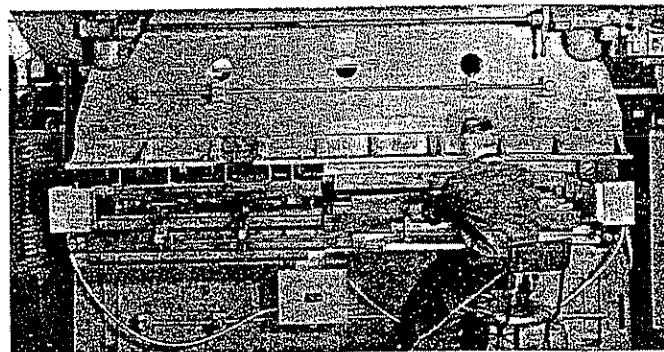
Searjeant Metal Products Inc.

Heath Co. Inc. Walter

Westinghouse Electric Corp.

Hoffman Engineering Co.

Reynolds Electric Co.

**GUARD—MACHINE—PHOTOELECTRIC**

The photoelectric guard can be adapted to many machinery applications where the operator is endangered by close proximity to dangerous machine areas or by the necessity of working in those areas. The guarding agent is a beam of light projected across the conveyor, machine bed, or any area to be controlled. When an object such as the operator's hand breaks into the beam, an electrical relay stops the machinery. **RECOMMENDED USES:** This control has been successfully used in the textile, paper and wire industries. (See: Guard—Photoelectric—Power Press)

★ELECTRONIC CONTROL CORP., 15341 Dale Ave., Detroit, MI 48223

Other Sources: (For addresses, see Source Index)

Autotron Inc.

Photobell Co. Inc.

Cutler-Hammer Inc.

Photomation Inc.

De-Tec-Tronic Corp.

Valley Metal Works Inc.

GUARD—SHEAR—PHOTOELECTRIC

Operators of power shears are protected from injury by a light beam which screens the danger area on the shear. Interruption of the light beam by the operator's hand, or

★See Advertisement & Index to Distributors.